JUN 1 1994

License No: 06-19183-01
Docket No: 030-17101
Control No: 112947

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: R. C. Cummings
Vice President, Finance
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

Dear Mr. Cummings:

Subject: Financial Assurance for Decommissioning

This is in reference to your various submittals dated July 24, 1990, September 17, 1992, August 13, 1992, and April 6, 1994 to provide financial assurance for License No. 06-19183-01. We have reviewed these documents and have no further questions at this time.

Based on the information provided in the above referenced documents, you are presently in compliance with the financial assurance requirements outlined in the decommissioning rule in 10 CFR 30.35.

If you have any questions, please contact Anthony Dimitriadis, of my staff, at (610) 337-6953.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
Mohamed M. Shanbaky

Mohamed M. Shanbaky, Chief
Research and Development Section
Division of Radiation Safety
and Safeguards

OFFICIAL RECORD COPY - C:\BACKUP.P1\BIPI22.FA - 05/20/94

ML 10

cc:
Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: Allyn M. Carnam
Senior Attorney
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: Vincent D. Chase, CHP
Radiation Safety Officer
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

bcc:
M. Shanbaky, RI
A. Dimitriadis, RI

DRSS:RI
Dimitriadis
05/ /94

DRSS:RI
Shanbaky
05/27/94

NOTE TO DMB:

THE ATTACHED DOCUMENTS ARE TO BE PROCESSED AS ONE FINANCIAL ASSURANCE FOR DECOMMISSIONING PACKAGE.

LICENSE NUMBER: 06-19183-01

DOCKET NUMBER: 030-17101

CONTROL NUMBER: 112947

THIS SHEET MAY BE DISCARDED AFTER PROCESSING.

THANK YOU!

Boehringer Ingelheim
Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd.
P.O. Box 368
Ridgefield, Connecticut 06877

April 6, 1994

VIA AIRBORNE EXPRESS

Ronald R. Bellamy, Chief
Nuclear Materials Safety Branch
Division of Radiation Safety
and Safeguards
United States Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406-475

Dear Mr. Bellamy:

This is to acknowledge receipt of your Demand for Information ("DFI"), dated March 11, 1994, on March 15, 1994.

As your records will reflect, the Nuclear Regulatory Commission ("NRC") sent the DFI to Boehringer Ingelheim Pharmaceuticals, Inc., ("BIPI") after several months of discussions and exchange of written correspondence between NRC staff and BIPI; the most recent communication, between the NRC and BIPI, occurred on February 25, 1994 in which we advised the NRC of BIPI's intent to file a response in this matter on or before April 1, 1994. Additionally, after it was clear that BIPI was required, under NRC regulations, to submit a Decommissioning Funding Plan ("DFP"), with an appropriate surety or financial assurance, BIPI immediately began to identify potential contractors and subsequently retained Arthur D. Little, Inc. ("ADL") to draft a DFP for submission to the NRC.

BIPI simultaneously began the process to determine whether the Company was eligible, under NRC's financial assurance guidelines, to qualify for use of a Parent Company Guarantee as the instrument to insure financial assurance in connection with the implementation of the DFP. We now have determined that it is more appropriate for BIPI to obtain a Letter of Credit and execute a Standby Trust Agreement as the mechanism for meeting the NRC's financial assurance requirements regarding this matter.

Telephone (203) 798-9988

Therefore, we are herewith submitting to the NRC the following documents in accordance with the provisions of the DFI and the applicable NRC regulations --

Tab No.	Description
1	The decommissioning cost estimate from ADL, dated March 31, 1994;
2	The Letter of Credit, in the amount of $200,000, which shall expire on September 1, 1999, the anticipated expiration date of BIPI's yet to be issued NRC license renewal;
3	The Standby Trust Agreement, dated March 31, 1994, to be utilized to pay the costs of decommissioning if BIPI fails to decommission as required by the NRC;
4	A copy of the Unanimous Written Consent of Directors ("Consent") of BIPI authorizing the Company's Vice President - Finance, Raymond C. Cummings, to execute documents such as the Standby Trust Agreement on behalf of BIPI.
5	Response to Demand for Information of March 11, 1994, from the Nuclear Regulatory Commission, dated April 1, 1994.

You will note that the Consent identifies twenty-two specific transactions requiring approval of the BIPI Board of Directors and since establishing a standby trust is not included among these transactions, BIPI's Vice President - Finance is the proper officer to undertake this financial transaction on behalf of the Company. In short, since the foregoing transaction is not reserved to the Board, it is delegated to BIPI's officers.

In our judgment, the foregoing and the enclosures herewith represent a complete and accurate response to the DFI; the NRC's correspondence with BIPI and the requirements of the applicable NRC regulations regarding this matter. If your office has any questions regarding the data, information and documents we are herewith filing with the NRC, please contact BIPI's Radiation Safety Officer, Vincent Chase, directly (203-798-6270).

Finally, for the record, BIPI does not agree with, or

acquiesce in, the NRC's allegation that the Company is not in compliance with the applicable requirements of Section 30.35, Title 10, Code of Federal Regulations. During the period of time referenced in Paragraph II of the DFI, BIPI made repeated inquiries to the NRC relating to regulatory requirements, licensing options and whether BIPI was required to file a DFP (and the related attendant documents) with the NRC. However, once the NRC and BIPI were in agreement on the regulatory requirements with which we were obligated to comply, BIPI promptly took the appropriate actions to achieve the level of compliance signified by this submission. Although the foregoing is being forwarded to the NRC without prejudice and represents a general response to the DFI, BIPI herein reserves its right to supplement this response, if appropriate and warranted, or otherwise required by the NRC. Furthermore, this general response should in no way be construed as waiving an opportunity to provide specific and detailed responses to each of the allegations set forth in the DFI and appended documents.

Very truly yours,

James J. Keirns, Ph. D.,
Chairman, Radiation Safety
Committee

JJK/vva

Bellamy.ltr

Arthur D Little

Arthur D. Little, Inc.
Acorn Park
Cambridge, Massachusetts
02140-2390
U.S.A.

Main Number 617.498.5000
Fax 617.498.7200
Telex 921436

March 30, 1994

Vince Chase
Boehringer Ingelheim Pharmaceuticals, Inc.
Research and Development Center
900 Ridgebury Road
P.O. Box 368
Ridgefield, CT 06877-0368

Re: Decommissioning Cost Estimate Final Report

Dear Vince:

Enclosed is the Decommissioning Cost Estimate report for Boehringer Ingelheim Pharmaceuticals that you requested. We hope that it is satisfactory considering the time constraints involved in producing the report to assist you in meeting the NRC's requirements. Please call if you need any further information or have any questions regarding the content of this report. Thank you.

Sincerely,

Susan M. Burrill

Susan M. Burrill

Enclosure

Arthur D Little

Arthur D Little

Decommissioning Cost Estimate

Report to Boehringer Ingelheim Pharmaceuticals, Inc.

March 30, 1994

Arthur D. Little, Inc.
Acorn Park
Cambridge, Massachusetts
02140-2390

Reference 46215-00

Notice

This report was prepared by Arthur D. Little, Inc., at the request of Boehringer Ingelheim Pharmaceuticals, Inc. The material in this report reflects Arthur D. Little's best judgement in light of the information available at the time of preparation. Any use that a third party makes of this report, or reliance on, or any decisions to be made based on it, is the responsibility of such third party. Arthur D. Little, Inc., accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

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As a part of the Nuclear Regulatory Commission (NRC) radioactive materials license regulations, Boehringer Ingelheim Pharmaceuticals, Inc. (BIPI) is required to submit a decommissioning funding plan as specified in Part 30.35 "Financial Assurance and Recordkeeping for Decommissioning," Title 10 of the Code of Federal Regulations (CFR). In preparing a decommissioning funding plan, a site-specific decommissioning cost estimate must be prepared. BIPI must assure that financial resources are in place to decommission its licensed operations, and also provide for the estimated costs of handling, transport, and ultimate disposal of material contaminated with radioactivity.

This report provides a best estimate of the cost of decommissioning BIPI facilities based on currently available waste disposal facilities and costs, and NRC guidance documents (as referenced).

Report Structure

Sections 1 through 5 of this report correspond to the five separate tasks involved in preparing the decommissioning cost estimate. A summary of the decommissioning cost estimate is presented in Section 6 and references are included in Section 7. Brief descriptions of the contents of this report are as follows:

- **Section 1: Estimate of Time Required for Planning and Preparation of the Decommissioning Plan**
  The decommissioning cost estimate begins by estimating the time allowances for planning and preparation of the decommissioning of a facility or a site. Planning and preparation includes activities to ensure that the decommissioning effort is performed in a safe and cost-effective manner in accordance with all applicable federal, state and local regulations. Portions of this section, such as characterization of the radiological condition of the facility, may be staffed by outside contractors who are experienced in such activities.

- **Section 2: Estimate of Decontamination and Dismantling Costs**
  Decontamination and dismantling cost estimates for BIPI facilities where radionuclides are used in an unsealed form are projected for decommissioning activities. Since BIPI is primarily involved in studies using low-levels of radionuclides, and uses contamination control techniques, it is expected that all facility components will be decontaminated to unrestricted release levels. In fact, according to the NRC,[1] decontamination of facility components is typically the best alternative for decommissioning radionuclide laboratory facilities. The typical laboratory components included in this analysis are laboratory benches, fume hoods, glove boxes, floors, walls, sinks and refrigerators. This estimate also includes an additional allowance of drums for disposal of miscellaneous small equipment such as centrifuges, balances, hot plates, etc. Decommissioning contractors may be hired by BIPI to perform decontamination and dismantling activities.

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[1] NUREG/CR-1754, Addendum 1, "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities, a Compendium of Current Information," p. iii, October 1989.

- **Section 3: Estimate of Packaging, Shipping, and Disposal Costs**
  Projecting the types and quantities of radioactive wastes generated during decommissioning is necessary in estimating the costs of packaging, shipping and disposal. Waste generated during the decommissioning of BIPI facilities is expected to contain very low-level radioactive contamination. Examples of types of waste generated as a result of cleanup operations include paper, rubber gloves, protective clothing, non-hazardous decontamination solutions and wash solutions. The greater the volume of radioactive waste produced, the higher the associated costs for packaging, shipping and disposal. To minimize waste disposal costs, BIPI will use waste volume minimization techniques such as compaction whenever possible to reduce the total volume of waste for packaging, shipping and disposal.

  Shallow-land burial in Barnwell, South Carolina low-level waste burial site is the current disposal method used by BIPI. However, BIPI is preparing a long term storage facility to be used for radioactive waste once the Barnwell site closes.

- **Section 4: Estimate of Remediation Costs**
  BIPI has no methods or practices where a potential exists for contamination to reach the soils surrounding the Research and Development facility that could require remediation. However, for informational purposes only, this section contains an overview of what is required for site remediation in the event that it becomes necessary in the future.

- **Section 5: Estimate Final Radiation Survey Cost**
  An NRC radioactive materials license cannot be terminated and the premises released for unrestricted use until a radiological survey is performed to verify that levels of radiological contamination are below currently accepted NRC contamination release limits.[2] As such, a comprehensive final radiation survey is to be performed after decommissioning activities have been completed to verify that any residual radioactive contamination is below such unrestricted release limits.

- **Section 6: Summary and Conclusions of Decommissioning Cost Estimate**
  A summary for the cost of each of the five steps involved in the decommissioning is presented along with the total cost of decommissioning (including a 25% contingency factor recommended by the NRC).

- **Section 7: References**
  All references used and referred to in this decommissioning cost estimate are presented in this section.

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[2] NRC Regulatory Guide 8.23, "Radiation Safety Surveys at Medical Institutions," p. 8.23-9, January 1981.

Regulatory Background

In 1988, the NRC established technical and financial regulations for decommissioning licensed radiological facilities. The purpose of these new regulations was to ensure payment for the safe and timely decommissioning of all facilities after licensed activities had ceased. Facilities holding licenses under 10 CFR 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material" were required to address decommissioning planning needs, timing, funding methods, and environmental reviews.

According to the NRC,[3] there are thousands of licensed non-fuel-cycle facilities in the United States that handle radioactive material. Operations at these facilities range from occasional use of short-lived radionuclides by a physician to those with large-scale processing of radioactive materials. Because of the diversity in type and size of facilities licensed to handle radioactive materials, the level of effort required to decommission them varies greatly. Necessary actions can range from simple, relatively inexpensive administrative procedures to extensive decontamination and/or dismantling activities. Included as an attachment to this section is a flow diagram which illustrates the general decommissioning process.[4]

BIPI possesses a "Type A" broad scope NRC radioactive materials license issued under 10 CFR 30. Currently, the Research and Development complex at BIPI has approximately sixty-two low-level radioactive material use laboratories and one low-level radioactive waste transfer room distributed among four buildings and a separate building for long term storage of regulated waste (not yet open for use). As required under the 1988 regulations, BIPI must address the decommissioning planning needs of these facilities.

A primary goal of decommissioning is to terminate the radioactive material license and release the facility for unrestricted use. Once released for unrestricted use, access to the facilities and sites will no longer need to be limited or controlled.[5] Residual radioactivity levels permitted by formal decontamination and decommissioning criteria will determine the magnitude of the decontamination and decommissioning task in terms of the quantity of waste to be removed, packaged, shipped and disposed.[6]

In addition to formal regulations for the decommissioning of licensed facilities, the NRC prepares regulatory guidance documents to aid licensees in preparing for and conducting decommissioning activities. In particular, NUREG/CR-1754 and NUREG/CR-1754, Addendum 1, contain detailed information regarding decommissioning alternatives, financing and methods, and time and cost estimates for decommissioning of facility

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[3] NUREG/CR-1754, "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities," p. 1-1, February 1981.

[4] NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination," p. 2.2, June 1992.

[5] 10 CFR 20.1003, "Unrestricted Area."

[6] NRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," June 1974.

components.[7,8] NUREG/CR-5849 provides additional guidance on radiological surveys.[9]

All regulations related to the packaging, shipping and disposal of low-level radioactive wastes apply to wastes generated during decommissioning. In 1966, the U.S. Department of Transportation (DOT) was created and given the regulatory responsibility for hazardous materials transportation. Since that time, packaging and transportation of nuclear materials have been regulated principally by the DOT. The regulations applicable to shipments of nuclear materials are published in 49 CFR, Parts 171-178, "Subchapter C - Hazardous Materials Regulations."

The NRC also has regulatory responsibility for safety, licensing, receipt, possession, use, transfer, and transport of byproduct, source, and special nuclear material. Regulations for their licensees regarding the transportation of radioactive material are found in 10 CFR, Part 71, "Packaging and Transportation of Radioactive Material," which compliment and incorporate by reference the DOT regulations.

As previously noted, in 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," the NRC also has regulatory responsibility for land disposal of radioactive waste. Included in this part are the waste classifications, procedures, criteria, terms, and conditions upon which the Commission issues licenses for the disposal of radioactive wastes containing byproduct, source and special nuclear material received from other persons. Low-level radioactive wastes generated at BIPI facilities are currently shipped to Barnwell, South Carolina. After June 30, 1994, low-level radioactive wastes generated will be stored in the BIPI Regulated Waste facility.

According to the NRC in NUREG/CR-1754, there are two documents recognized by regulatory agencies and the nuclear industry as providing guidance on acceptable levels of radioactive surface contamination for the release of equipment, facilities and sites for unrestricted use. These documents are "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," prepared by the NRC and "Control of Radioactive Surface Contamination on Materials, Equipment and Facilities to be Released for Uncontrolled Use," a draft document prepared by an American National Standards Institute (ANSI) committee. Another document which is referenced in these two recommended guidance documents, and provides currently accepted decommissioning release criterion is NRC Regulatory Guide 1.86.

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[7] NUREG/CR-1754, op cit.

[8] NUREG/CR-1754, Addendum 1, op cit.

[9] NUREG/CR-5849, op cit.

Measures must be taken to verify that residual levels of radioactivity in facilities and sites are below unrestricted release limits to preclude any concern about future inadvertent radiation exposure to the public. As such, a final radiological survey is performed to assess the condition of the facilities and sites after decontamination and decommissioning activities are completed. The final radiation survey serves as a mechanism to assure that levels of residual radioactive contamination are acceptable.

1.0 Estimate of Time Required for Planning and Preparation of the Decommissioning Plan

Planning and preparation of the decommissioning plan involves six tasks: preparation of documentation for regulatory agencies, submittal of decommissioning plan to the NRC, development of work plans, procuring of special equipment, staff training, and radiological characterization of the facilities. The time required to complete each of these six tasks is estimated using the Cost Estimating Table in NRC Regulatory Guide 3.66.[1]

1.1 Preparation of Documentation for Regulatory Agencies

In decommissioning facilities and sites which use low-levels of radioactivity, BIPI must abide by applicable federal regulations and guidelines, and national standards that pertain to many different topics. The regulatory documentation required for decommissioning of BIPI facilities is described in this section. The number of work days needed for the preparation of this documentation is estimated to be 8.25 days, allowing for one supervisor for three days, one health physicist for five days, and one secretary for one-quarter day.

- **License Termination and Facility Release** - Should BIPI decide to terminate their NRC radioactive materials license and begin facility release activities (decommissioning), 10 CFR 30.36, "Expiration and Termination of Licenses," requires, in part, that BIPI "promptly notify the NRC in writing" of their intention and to submit a completed Form NRC-314. This form is included as an attachment to NRC Regulatory Guide 3.65 and serves as certification of disposition of materials.[2]

- **Environmental Impact Statements** - In the provisions of 10 CFR 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," the decommissioning of some licensee facilities may require the preparation of an environmental impact statement by the NRC. The need to prepare an environmental impact statement is determined by the NRC on a case-by-case basis.

- **Occupational Radiation Standards** - As part of 10 CFR 20, "Standards for Protection Against Radiation," sections 20.1201 "Occupational dose limits for adults," and 20.1203 "Determination of internal dose from airborne radioactive material," give the maximum permissible limits for occupational radiation exposure. Based on knowledge of BIPI's typical inventory and operations, it is improbable that even a fraction of these annual occupational dose limits would be exceeded during decommissioning operations.

- **Public and Environmental Radiation Standards** - Also included as part of

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[1] NRC Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning under 10 CFR Parts 30, 40, 70, and 72," Appendix F, June 1990.

[2] NRC Regulatory Guide 3.65 "Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70," Appendix 1, August 1989.

10 CFR 20 are the maximum public exposure limits for external exposure, specified in section 20.1301 "Dose limits for individual members of the public." A judgement was made based on knowledge of BIPI's facilities, typical inventory and operations, that exposure to the public during decommissioning operations would be highly unlikely.

- **Transportation of Radioactive Wastes** - All radioactive material, contaminated laboratory equipment, or low-level radioactive waste generated during decommissioning (other than liquids discharged via sewer) must be transported according to the following regulations: 10 CFR 71, "Packaging and Transportation of Radioactive Material" and 49 CFR, Parts 171-178, "Subchapter C-Hazardous Materials Regulations."

- **Industrial Safety** - 29 CFR Parts 1910 to end, "Occupational Safety and Health Standards," contains industrial safety requirements which must be adhered to during decommissioning activities.

1.2 Submittal of a Decommissioning Plan to the NRC

If a licensee does not submit an application for renewal of their NRC radioactive materials license, they must terminate their use of byproduct material and begin decommissioning activities. A decommissioning plan must be submitted to the NRC, and their approval of the plan received, before any decommissioning activities can begin. BIPI may hire outside contractors to assist them in the preparation of this plan. Based on the current number of BIPI radioactive material user laboratories, submittal of the decommissioning plan is estimated to require 16.00 days, allowing for one supervisor for five days, one health physicist for ten days, and one secretary for one day. (See Table 1-1, line 2)

1.3 Development of Work Plans

Work plans are prepared to guide the performance of decommissioning activities. They should include all steps for preparing and implementing the decommissioning program and address decommissioning objectives, activities and tasks, a description and an analysis of decommissioning methods and procedures, and a schedule of operations. This is a time consuming task because the work plans must be very detailed, therefore BIPI may hire outside contractors to assist them in the preparation of these plans. This task is estimated to require 26.00 days, allowing for one supervisor for five days, one health physicist for twenty days, and one secretary for one day. (See Table 1-1, line 3)

1.4 Procuring Special Equipment

Special equipment for decommissioning is normally procured separately from radiation survey equipment and equipment for the analysis of wipe tests. BIPI may hire outside decommissioning contractors to assist them in decommissioning activities who would be

fully equipped with necessary special equipment. Examples of special equipment used in the decommissioning of a facility are: floor monitors, steam cleaners, wet/dry vacuums, powered floor scrubbers, oxyacetylene torches, pipe cutters, reciprocating saws, and scabblers. In order to save costs, BIPI may plan to utilize their own liquid scintillation counting equipment to count smear tests. As such, estimates for the purchase of liquid scintillation vials and fluid should be included. This task is estimated to require 0.75 days, allowing for one health physicist for one-half day and one secretary for one-quarter day. (See Table 1-1, line 4)

1.5 Staff Training

All staff involved with the decommissioning effort should receive eight hours of training in radiation safety according to 10 CFR 19 "Notices, Instructions, and Reports to Workers; Inspections." Personnel who regularly work with radioactive materials are assumed to have been trained in radiological safety procedures and to be capable of operating radiation survey equipment. This task is estimated to require 12.25 days, allowing for one supervisor for six days, one health physicist for six days, preparing for and offering 8-hour radiation safety training, and one-quarter day of secretarial support. BIPI may hire an outside contractor to conduct this training. (See Table 1-1, line 5)

1.6 Characterization of the Radiological Condition of the Facility

An accurate estimate of the radiological condition of the facility is important because the amount and type of radioactivity in the facility can directly affect the following: choice of method of decommissioning; projecting internal and external exposures for workers; assessing the need for decontamination as opposed to dismantling; determining shipping volumes and requirements for radioactive waste; determining burial or disposal requirements; and determining personal protective equipment requirements. As such, BIPI may hire a decommissioning contractor to conduct this characterization.

Areas where radioactive materials are currently being used for research purposes, for storing materials, or for waste must be surveyed in detail to determine their radiological condition with respect to fixed and removable contamination. BIPI has approximately sixty-two laboratories and one low-level waste radioactive waste transfer room, spread among four buildings where radioactive materials have been used for research purposes. In addition, BIPI has a building for long term storage of regulated waste that is not yet open for use. Currently, rigorous monthly surveys of all common areas (i.e., doors, hallways, spot checks of laboratories) and daily surveys of laboratory work areas are conducted to identify any contamination. This task is estimated to require 22.25 days, allowing for one supervisor for two days, one health physicist five days, one health physics technician for fifteen days, and one secretary for one-quarter day. (See Table 1-1, line 6)

In order to translate the total time estimated for planning and preparation of the decommissioning plan into labor costs, salary estimates are presented based on salaries

typically paid by BIPI or contractors. In Table 1-2, the annual cost for workers involved in a decommissioning effort and their overhead rate are estimated for the following general positions: supervisor, health physicist, secretary, craftsperson, and technician. These positions are given in the Cost Estimating Table found in NRC Regulatory Guide 3.66[3] as examples of typical positions used during the decommissioning process. To complete decommissioning activities in a reasonable period of time, decommissioning contractors may be hired to perform some of this work. If BIPI personnel perform some or all of the decommissioning activities, administrative overhead may be charged to the program.

Table 1-1: Work Days Needed for Planning and Preparation

Task	Super.	HP	Tech.	Sec.	Total
1. Preparation of Documentation for Regulatory Agencies[a]	3.00	5.00	0.00	0.25	8.25
2. Submittal of Decommissioning Plan to NRC[b]	5.00	10.00	0.00	1.00	16.00
3. Development of Work Plans	5.00	20.00	0.00	1.00	26.00
4. Procuring of Special Equipment[c]	0.00	0.50	0.00	0.25	0.75
5. Staff Training	6.00	6.00	0.00	0.25	12.25
6. Characterization of Radiological Condition of the Facility	2.00	5.00	15.00	0.25	22.25
7. Total Days	21.00	46.50	15.00	3.00	85.50

Time estimates were determined assuming that the following conditions apply:

a) All required regulations and forms are available to the supervisor and health physicist at the start of this task.
b) There is no delay in the assurance of funds for decommissioning.
c) Procurement of special equipment includes only the selection, ordering, and receiving the equipment; the time waiting for delivery is not chargeable to decommissioning.

[3] NRC Regulatory Guide 3.66, op cit.

Table 1-2: Unit Cost for Workers

Position	Basic Salary (Dollars/Year)	Overhead Rate (%)	Worker Cost/Year	Worker Cost/Day
Supervisor	$50,000.00	80%	$90,000.00	$346.15
Health Physicist	$70,000.00	80%	$126,000.00	$484.62
Secretary	$30,000.00	80%	$54,000.00	$207.69
Craftsperson*	$40,000.00	80%	$72,000.00	$276.92
Technician	$35,000.00	80%	$63,000.00	$242.31

* This position was not required for planning and preparation of the plan however the salary estimate was included because services will be required in other sections of the decommissioning cost estimate.

Multiplying the worker costs per day (as listed in Table 1-2) for each position by the total time required by each position to complete planning and preparation of the decommissioning plan (as listed in Table 1-1, line 7), the labor cost per position is obtained. Table 1-3 summarizes the labor costs for planning and preparation of the decommissioning plan.

Table 1-3: Summary of Labor Cost for Planning and Preparation of the Decommissioning Plan

Position	Worker Cost/Day	Total # Man-Days	Total Labor Cost
Supervisor	$346.15	21.00	$7,269.23
Health Physicist	$484.62	46.50	$22,534.62
Technician	$242.31	15.00	$3,634.62
Secretary	$207.69	3.00	$623.08
Total			$34,061.54

2.1 Projecting the Size and Quantity of Radioactive Facility Components Potentially Requiring Decontamination and/or Dismantling

Dimensions of facility components, such as fume hoods and laboratory benches, were assumed to be standard. These dimensions were assumed to be average dimensions for and representative of components in all laboratories and areas.

The numbers of components in the laboratories and areas were estimated by BIPI based on their knowledge of the equipment present in radioactive material laboratories. In order to estimate the amount of surface area which could potentially require decontamination and or dismantling, the following assumptions were made:

- **Not all facility components in laboratories and areas where radioactive materials are handled will require decontamination and/or dismantling.** BIPI requires that surface areas designated for radioactive material use are covered with bench coat such that if any material is spilled, there would be little or no surface contamination. To reduce the possibility of widespread hood/ductwork contamination, use of volatile compounds is restricted to the hoods in radiosynthesis laboratory. Confirmation of this through regular radiation surveys and wipe tests has demonstrated that these procedures are effective contamination control techniques. As such, all laboratory components, with the exception of sink drains and pipes, will be assumed to be decontaminated to unrestricted release levels with no dismantling performed. Researchers are not allowed to dispose of radionuclides in laboratory sinks and drains. Liquid wastes are collected for disposal by the radiation safety office therefore sink and drain contamination is expected to be minimal.

- **Only a fraction of the total surface area of laboratory benches, fume hoods, or other items in a laboratory or area is actually designated for radioactive material handling.** In order to reduce the possibility of the spread of contamination the percentage of surface area designated for radioactive material handling is less than the total surface area in a laboratory. These percentages were estimated based on BIPI's knowledge of the work performed in the laboratories. Table 2-1 presents these percentages.

Table 2-1: Percentage of Surface Area Designated for Radioactive Material Handling

Location Name	Percentage of Surface Area Designated for Radioactive Material Handling
Radiosynthesis Lab	100%
Waste Transfer Room	100%
Regulated Waste Facility	100%
All Other Labs	25%

- **Only a part of the surface area designated for radioactive material handling will potentially require decontamination due to contamination control efforts.** The percentage of surface area which will potentially require decontamination was estimated based on the BIPI's knowledge of the work performed in the laboratories and typical levels of contamination found. Table 2-2 presents these percentages. In addition, due to the contamination control techniques used in laboratories and the low likelihood of wall contamination, only 5% of the wall surfaces are estimated to require decontamination in the waste transfer room, regulated waste facility and all other labs, with the exception of the radiosynthesis labs, with an estimated 15%. This is confirmed through monthly surveys of all common areas and daily surveys of laboratory work areas. Items such as sink drains and pipes are not easily decontaminated and are therefore packaged for disposal.

Table 2-2: Percentage of Surface Area Designated for Radioactive Material Handling that Will Potentially Require Decontamination

Location Name	Percentage of Surface Area Designated for Radioactive Material Handling that Will Potentially Require Decontamination
Radiosynthesis Lab	75%
Waste Transfer Room	50%
Regulated Waste Facility	50%
All Other Labs	10%

2.1.1 Number and Total Surface Area of Large Equipment Potentially Requiring Decontamination

BIPI has one waste compactor in its regulated waste storage facility that is considered to be a large piece of equipment potentially requiring decontamination. The average surface area of this compactor was calculated to be approximately 7.9 m^2. The total surface area of the compactor was assumed to potentially require decontamination.

2.1.2 Number and Total Surface Area of Glove Boxes Potentially Requiring Decontamination

The number of glove boxes used for radioactive material handling at BIPI facilities was estimated to be two and their average surface area was calculated to be 7.3 m^2. To calculate the number and total surface area of glove boxes potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area of approximately 11.0 m^2, or an

equivalent of 1.5 glove boxes, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.3 Number and Total Surface Area of Fume Hoods Potentially Requiring Decontamination

The number of fume hoods used for radioactive material handling at BIPI facilities was estimated to be sixty-seven and their average surface area was calculated to be 5.9 m^2. To calculate the number and total surface area of fume hoods potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area of approximately 29.5 m^2, or an equivalent of 5.0 fume hoods, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.4 Surface Area of Ventilation Ductwork Potentially Requiring Decontamination

The surface area of ventilation ductwork from each of the sixty-seven fume hoods was estimated to be 3.7 m^2. In addition, the average surface area of ductwork from three snorkels in the waste facility was estimated to be 2.9 m^2. All lengths of ventilation ductwork are assumed able to be decontaminated; however, the time involved in this procedure could increase costs enough to make dismantling, compaction, packaging, and disposal a more viable option. As such, the decision to dismantle ventilation ductwork should be made on a case-by-case basis. To calculate the number and total surface area of ventilation ductwork potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area of approximately 27.2 m^2, or an equivalent of 8.0 ducts, could potentially require decontamination. The surface area of ductwork for decontamination noted are conservative estimates (refer to Attachment 2.1 for calculations).

2.1.5 Number and Total Surface Area of Laboratory Benches Potentially Requiring Decontamination

The number of laboratory benches used for radioactive material handling at BIPI facilities was estimated to be 130. An average area of 1.4 m^2 was estimated to represent each laboratory bench in BIPI facilities. To calculate the number and total surface area of laboratory benches potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area of 10.6 m^2, or an equivalent of 7.6 laboratory benches, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.6 Number and Total Surface Area of Sinks Potentially Requiring Decontamination

The number of sinks used in radioactive material handling laboratories at BIPI facilities

was estimated to be sixty-six. The following assumptions were based on BIPI's knowledge of the number of sinks in laboratories and areas. An average area of 1.3 m^2 was estimated to represent each sink in BIPI facilities. To calculate the number and total surface area of sinks potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area of 5.6 m^2, or an equivalent of 4.3 sinks, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.7 Length of Drains and Pipes Potentially Requiring Decontamination

The average length of drain and pipe from each of the 66 sinks potentially requiring decontamination was estimated to be 3.0 m. It was assumed that in the radiosynthesis laboratories and the waste facility, 10% of the sinks are used for radioactive material handling; in the waste room, there are no sinks used for radioactive material handling; in all other laboratories, 20% of the sinks have the potential to become inadvertently contaminated due to radioactive material handling. Due to the difficulty in decontaminating drains and pipes, all potentially contaminated drains and pipes used for radioactive material handling are assumed to be dismantled and packaged for disposal. Therefore length of drains and pipes for dismantling was calculated to be 38.4 m, or an equivalent 12.8 drains and pipes (refer to Attachment 2.1 for calculations).

2.1.8 Amount of Floor Space Potentially Requiring Decontamination

The amount of floor space in laboratories that has the potential to become inadvertently contaminated due to radioactive material handling and waste storage at BIPI facilities will not equal the total floor space in a laboratory or area. Some of the floor space is covered by laboratory benches, fume hoods, and large equipment that can not be easily moved. Only floor space that is not covered by laboratory hardware is considered to potentially require decontamination. The amount of floor space not covered by equipment was estimated to be approximately 50% of the total floor space. To calculate the number and total surface area of floor space potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total amount of floor space for all BIPI facilities of 510.3 m^2, or an equivalent of 1.8 floors, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.9 Amount of Wall Surface Area Potentially Requiring Decontamination

Due to aggressive contamination control techniques practices at BIPI facilities, it is very unlikely that contamination would occur on walls in radioactive material handling laboratories or waste storage areas. However, it is assumed that there would be a slight chance of some contamination occurring on walls and all wall surface area was assumed to be decontaminated to currently accepted unrestricted release levels. The total amount of wall surface area in each laboratory was estimated by multiplying the average length of each wall by the height to the ceiling (assuming a standard height of 3 meters), then multiplying by 4 (the average number of walls in each laboratory or area). It was

assumed that 50% of the total wall space is covered by equipment. To calculate the number and total surface area of walls potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total area of wall space in all laboratories and areas of 42.3 m^2, or an equivalent of 7.0 walls, could potentially require decontamination (refer to Attachment 2.1 for calculations).

2.1.10 Number and Total Surface Area of Refrigerators Potentially Requiring Decontamination

The number of refrigerators in BIPI's radioactive material laboratories was estimated to be sixty-five. This is based on BIPI's knowledge of the number of refrigerators in laboratories and areas. An average surface area of refrigerators was estimated to be 8.2 m^2. To calculate the number and total surface area of refrigerators potentially requiring decontamination in all BIPI facilities, assumptions found in Tables 2-1 and 2-2 regarding the percentage of surface area actually used for radioactive material handling and the percentage of that surface area actually requiring decontamination, respectively, were used. Based on these assumptions, a total surface area for refrigerators of 27.1 m^2, or an equivalent of 3.3 refrigerators, could potentially require decontamination (refer to Appendix 2.1 for calculations).

2.1.11 Number and Total Surface Area of Small Laboratory Equipment Potentially Requiring Decontamination

It is assumed that there would be other small laboratory equipment which would require decontamination or disposal if the time involved in decontamination would not be cost effective. Due to the variety of equipment that could be present in a laboratory, an estimate of the number and total surface area was not feasible; however, allowances for their decontamination or disposal will be made.

2.2 Estimated Number of Workdays Required to Complete Decontamination

To estimate the time necessary to complete decontamination, it is assumed that a certain percentage of the total time allowed for each task distributed to each position; 5% of a supervisor's time, 80% of a technician's time, 5% of a health physicist's time and 15% of a craftsperson's time. The only exception to these percentages would be for monitoring for compliance, recleaning and remonitoring, if necessary. In this case, 50% of the total time allowed for each decontamination task was distributed to each position for monitoring for compliance, recleaning and remonitoring. All estimates included equipment removal and surveying, decontamination and monitoring, recleaning of contaminated spots, remonitoring, and 50% ancillary time (i.e., breaks, set-up time). Suggested time allowances for the decontamination tasks were estimated based on experience conducting such decontaminations. These were used to develop probable time allowances in person-days for each of the decontamination tasks at BIPI which are discussed in the following sections.

Table 2-3 summarizes all of the information described in Section 2.1.

Table 2-3: Estimates of the Total Surface Area and Equivalent Number of Facility Components Potentially Requiring Decontamination

Component	Total Surface Area or Length for Decontamination (m^2 or m)	Equivalent Number for Decontamination
Compactor	7.9	1.0
Fume Hoods	29.5	5.0
Ventilation Ductwork	27.2	8.0
Laboratory Benches	10.6	7.6
Sinks	5.5	4.3
Drains and Pipes	38.4	12.8
Floor Space	510.3	1.8
Wall Space	42.3	7.0
Refrigerators	27.1	3.3
Glove Boxes	10.9	1.5

2.2.1 Estimated Number of Workdays Required to Decontaminate Large Equipment

Decontamination of the waste compactor is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of the waste compactor would require 1.00 day, the estimated total time involved in the decontamination of 7.9 m^2 or 1.0 potentially contaminated compactor was calculated to be 1.00 day. This allowed for approximately 0.1 days of a supervisor's time, 0.6 days of a technician's time, 0.1 days of a health physicist's time, and 0.2 days of a craftsperson's time.

2.2.2 Estimated Number of Workdays Required to Decontaminate Glove Boxes

Decontamination of glove boxes is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one glove box would require 0.75 days, the estimated total time involved in the decontamination of 11.0 m^2 or 1.5 potentially contaminated glove boxes was calculated to be 1.1 days. This allowed for 0.1 days of a supervisor's time, 0.7 days of a technician's time, 0.1 days of a health physicist's time, and 0.2 days of a

craftsperson's time.

2.2.3 Estimated Number of Workdays Required to Decontaminate Fume Hoods

Decontamination of fume hoods is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one fume hood would require 0.75 days, the estimated total time involved in the decontamination of 29.5 m^2 or 5.0 potentially contaminated fume hoods was calculated to be 3.75 days. This allowed for 0.19 days of a supervisor's time, 3.00 days of a technician's time, 0.19 days of a health physicist's time, and 0.56 days of a craftsperson's time.

2.2.4 Estimated Number of Workdays Required to Decontaminate Laboratory Benches

Decontamination of the laboratory benches is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one laboratory bench would require 0.50 days, the estimated total time involved in the decontamination of 10.7 m^2 or 7.6 potentially contaminated laboratory benches was calculated to be 3.8 days. This allowed for 0.2 days of a supervisor's time, 2.8 days of a technician's time, 0.2 days of a health physicist's time, and 0.6 days of a craftsperson's time.

2.2.5 Estimated Number of Workdays Required to Decontaminate Sinks

Decontamination of the sinks is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one sink would require 0.25 days, the estimated total time involved in the decontamination of 5.6 m^2 or 4.3 potentially contaminated sinks was calculated to be 1.1 days. This allowed for 0.1 days of a supervisor's time, 0.7 days of a technician's time, 0.1 days of a health physicist's time, and 0.2 days of a craftsperson's time.

2.2.6 Estimated Number of Workdays Required to Decontaminate Floor Surface

Decontamination of the floor surface is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one floor would require 1.00 day, the estimated total time involved in the decontamination of 510.3 m^2 or 1.8 potentially contaminated floors was calculated to be 1.8 days. This allowed for 0.1 days of a supervisor's time, 1.3 days of a technician's time, 0.1 days of a health physicist's time, and 0.3 days of a craftsperson's time.

2.2.7 Estimated Number of Workdays Required to Decontaminate Wall Surface

Decontamination of the wall surface is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one wall would require 0.50 days, the

estimated total time involved in the decontamination of 42.3 m^2 or 7.0 potentially contaminated walls was calculated to be 3.5 days. This allowed for 0.2 days of a supervisor's time, 2.6 days of a technician's time, 0.2 days of a health physicist's time, and 0.5 days of a craftsperson's time.

2.2.8 Estimated Number of Workdays Required to Decontaminate Refrigerators

Decontamination of the refrigerators is based on reducing residual surface contamination to currently accepted unrestricted release levels. Based on the assumption that the decontamination of one refrigerator would require 0.75 days, the estimated total time involved in the decontamination of 27.1 m^2 or 3.3 potentially contaminated refrigerator was calculated to be 2.5 days. This allowed for 0.1 days of a supervisor's time, 1.9 days of a technician's time, 0.1 days of a health physicist's time and 0.4 days of a craftsperson's time.

2.2.9 Estimated Number of Workdays Required to Decontaminate Ventilation Ductwork

As stated in Section 2.1.3 of this report, ventilation ductwork will be evaluated for contamination on a case by case basis but will be assumed to be decontaminated. The estimated total time involved in the decontamination of 27.2 m^2 or 8.0 potentially contaminated ventilation ducts was calculated to be 8.0 days, allowing for 0.4 days of a supervisor's time, 6.4 days of a technician's time, 0.4 days of a health physicist's time, and 0.8 days of a craftsperson's time.

2.2.10 Estimated Number of Workdays Required to Dismantle Drains and Pipes

As stated in Section 2.1.6 of this report, drains and pipes are assumed to be dismantled and packaged for disposal. Based on assumptions stated in Section 2.2 of this report, the estimated total time involved in the dismantling of 12.8 potentially contaminated drains and pipes was calculated to be 3.2 days, allowing for 0.2 days of a supervisor's time, 2.6 days of a technician's time, 0.2 days of a health physicist's time, and 0.5 days of a craftsperson's time.

2.2.11 Monitoring for Compliance, Recleaning and Remonitoring

A final radiation survey should include laboratories, storage areas, waste accumulation areas, and other areas where radioactive contamination was detected. In addition, building corridors, rest rooms, offices, equipment rooms, etc., should be surveyed for any unsuspected contamination. If any contamination is found above release limits, the decontamination process for the item or area is repeated. The total time involved in monitoring for compliance, recleaning, and remonitoring, if necessary, was estimated to be 50% of the total time needed to complete all decontamination activities thus far. Therefore, this monitoring required a total of 15.1 days, allowing for 0.9 days of a supervisor's time, 11.2 days of a technician's time, 0.9 days of a health physicist's time, and 2.2 days of a craftsperson's time.

Table 2-4 summarizes the estimates developed for the number of work days required to complete decontamination and/or dismantling tasks and Table 2-5 lists the cost to complete these tasks by job category.

Table 2-4: Estimated Number of Work Days Required for Decontamination and/or Dismantling Tasks

Task	Super	Tech	HP	Craft	Total
Decontaminate Fume Hoods, Laboratory Benches, Sinks, Floors, Walls, Glove Boxes, Compactor, and Refrigerators	1.1	13.4	1.1	3.0	18.6
Decontaminate Ventilation Ducts and Dismantle Drains and Pipes	0.6	9.0	0.6	1.3	11.5
Monitor for Compliance, Reclean and Remonitor, if Necessary	0.9	11.2	0.9	2.2	15.1
Total Number of Work Days per Position	2.6	33.6	2.6	6.5	45.2

899.99
3,141.62
1,260.12
1,799.98
12,101.71
$5556
453 days diff.

Table 2-5: Estimated Costs for Workers During Decontamination Tasks

Position	Worker Cost/Day	Number of Work Days	Total Cost
Supervisor	$346.15	2.6	$882.69
Technician	$242.31	33.6	$8,141.54
Health Physicist	$484.62	2.6	$1,235.77
Craftsperson	$276.92	6.5	$1,786.15
Total		45.2	$12,046.15

2.3 Quantities and Costs of Special Equipment for Decontamination and/or Dismantling

Special equipment for decommissioning is normally procured separately from radiation survey equipment and equipment for analysis of wipe tests. BIPI may hire an outside contractor to assist them in decommissioning activities who would be fully equipped with

necessary special equipment. BIPI may utilize their own radiation survey equipment for the analysis of wipe tests. Therefore, the estimates for the purchase of liquid scintillation vials and fluid are included in Table 2-6.

Table 2-6: Cost Estimates of Special Equipment and Supplies

Equipment and Supplies	Quantity	Cost of Each	Total Cost
Anti-contamination Clothing[a]	50	$4.02	$201.00
Decontamination Solution[b]	1	$871.06	$871.00
Polyethylene Sheets (per m^2)	100	$2.35	$235.00
Liquid Scintillation Vials (500/case, # cases)	15	$90.00	$1,350.00
Liquid Scintillation Cocktail (per gallon, # gallons)	30	$60.00	$1,800.00
Total			$4,456.59

a) Anti-contamination clothing assumed to be disposable and two suits are worn for each work day required to complete decontamination.
b) Price for decontamination solution is per 208-liter drum.

Table 2-7 summarizes the estimates developed in this section for decontamination and dismantling costs.

Table 2-7: Summary of Decontamination and Dismantling Costs

	Cost
Workdays for Decontamination/Dismantling	$12,155.19
Equipment Purchase	$4,456.59
Total	$16,611.79

2 drums of waste

minimum LSV's. (Adds to costs)

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination

Section 2.1.1: Large Equipment: Waste Compactor

Average Surface Area		Number in		Percentage of Surface Area for Handling		Percentage of Surface Area for Decon		Estimated Surface Area of Waste Compactor for Decon in
= 7.9 m^2	X	Radiosynthesis Lab = 0	X	= 100%	X	= 75%	=	Radiosynthesis Lab = 0.0 m^2
= 7.9 m^2	X	Waste Room = 0	X	= 100%	X	= 100%	=	Waste Room = 0.0 m^2
= 7.9 m^2	X	Waste Facility = 1	X	= 100%	X	= 100%	=	Waste Facility = 7.9 m^2
= 7.9 m^2	X	All Other Labs = 0	X	= 25%	X	= 10%	=	All other Labs = 0.0 m^2

Total Surface Area of Waste Compactor for Decontamination in all Four Areas is 7.9 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.2: Glove Boxes

Average Surface Area		Number		Percentage of Surface Area for Handling		Percentage of Surface Area for Decon	=	Estimated Surface Area of Glove Boxes for Decon
$7.3\ m^2$	X	Radiosynthesis Lab = 2	X	= 100%	X	= 75%	=	Radiosynthesis Lab = $11.0\ m^2$
$7.3\ m^2$	X	Waste Room = 0	X	= 100%	X	= 50%	=	Waste Room = $0.0\ m^2$
$7.3\ m^2$	X	Waste Facility = 0	X	= 100%	X	= 50%	=	Waste Facility = $0.0\ m^2$
$7.3\ m^2$	X	All Other Labs = 0	X	= 25%	X	= 10%	=	All other Labs = $0.0\ m^2$

Total Surface Area of Glove Boxes for Decontamination in all Four Areas is 11.0 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.3: Fume Hoods

Average Surface Area		Number in		Percentage of Surface Area for Handling		Percentage of Surface Area for Decon	=	Estimated Surface Area of Fume Hoods for Decon in
= 5.9 m^2	X	Radiosynthesis Lab = 4	X	= 100%	X	= 100%	=	Radiosynthesis Lab = 23.6 m^2
Average Surface Area = 5.9 m^2	X	Number in Waste Room = 0	X	Percentage of Surface Area for Handling = 0%	X	Percentage of Surface Area for Decon = 0%	=	Estimated Surface Area of Fume Hoods for Decon in Waste Room = 0.0 m^2
Average Surface Area = 5.9 m^2	X	Number in Waste Facility = 1	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 100%	=	Estimated Surface Area of Fume Hood for Decon in Waste Facility = 5.9 m^2
Average Surface Area = 5.9 m^2	X	Number in All Other Labs = 62	X	Percentage of Surface Area for Handling = 0%	X	Percentage of Surface Area for Decon = 0%	=	Estimated Surface Area of Fume Hoods for Decon in All Other Labs = 0.0 m^2

Total Surface Area of Fume Hoods for Decontamination in all Four Areas is 29.5 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.4 Ventilation Ductwork

Average Surface Area = 3.7 m^2	X	Number in Radiosynthesis Lab = 4	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 100%	=	Estimated Surface Area of Ventilation Ducts for Decon in Radiosynthesis Lab = 14.8 m^2
Average Surface Area = 3.7 m^2	X	Number in Waste Room = 0	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 100%	=	Estimated Surface Area of Ventilation Ducts for Decon in Waste Room = 0.0 m^2
Average Surface Area = 3.7 m^2	X	Number in Waste Facility = 1	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 100%	=	Estimated Surface Area of Ventilation Ducts for Decon in Waste Facility = 3.7 m^2
Average Surface Area = 2.9 m^2	X	Number of Snorkels in Waste Facility = 3	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 100%	=	Estimated Surface Area of Ventilation Duct Snorkels for Decon in Waste Facility = 8.7 m^2
Average Surface Area = 3.7 m^2	X	Number in All Other Labs = 62	X	Percentage of Surface Area for Handling = 0%	X	Percentage of Surface Area for Decon = 0%	=	Estimated Surface Area of Ventilation Ducts for Decon in All Other Labs = 0.0 m^2

Total Surface Area of Ducts for Decontamination in all Four Areas is 27.2 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.5: Laboratory Benches

Average Surface Area		Number		Percentage of Surface Area for Handling		Percentage of Surface Area for Decon	=	Estimated Surface Area of Lab Benches for Decon
= 1.4 m^2	X	Number in Radiosynthesis Lab = 6	X	= 100%	X	= 75%	=	Radiosynthesis Lab = 6.3 m^2
= 1.4 m^2	X	Number in Waste Room = 0	X	= 100%	X	= 50%	=	Waste Room = 0.0 m^2
= 1.4 m^2	X	Number in Waste Facility = 0	X	= 100%	X	= 50%	=	Waste Facility = 0.0 m^2
= 1.4 m^2	X	Number in All Other Labs = 24	X	= 25%	X	= 10%	=	All Other Labs = 4.3 m^2

Total Surface Area of Laboratory Benches for Decontamination in all Four Areas is 10.6 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.6: Sinks

Average Surface Area		Number in		Percentage of Surface Area for Handling		Percentage of Surface Area for Decon	=	Estimated Surface Area of Sinks for Decon in
= 1.3 m^2	X	Radiosynthesis Lab = 3	X	= 100%	X	= 75%	=	Radiosynthesis Lab = 2.9 m^2
= 1.3 m^2	X	Waste Room = 0	X	= 100%	X	= 50%	=	Waste Room = 0.0 m^2
= 1.3 m^2	X	Waste Facility = 1	X	= 100%	X	= 50%	=	Waste Facility = 0.7 m^2
= 1.3 m^2	X	All Other Labs = 62	X	= 25%	X	= 10%	=	All Other Labs = 2.0 m^2

Total Surface Area of Sinks for Decontamination in all Four Areas is 5.6 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.7 Drains and Pipes

Average Length		Number		Percentage of Length for Handling		Percentage of Length for Decon		Total Estimated Length of Drains and Pipes for Decon
= 3.0 m	X	Number in Radiosynthesis Lab = 3	X	= 10%	X	= 100%	=	in Radiosynthesis Lab = 0.9 m
= 3.0 m	X	Number in Waste Room = 0	X	= 0%	X	= 0%	=	in Waste Room = 0.0 m
= 3.0 m	X	Number in Waste Facility = 1	X	= 0%	X	= 0%	=	in Waste Facility = 0.0 m
= 3.0 m	X	Number in All Other Labs = 62	X	= 20%	X	= 100%	=	in All Other Labs = 37.2 m

Total Length of Drains and Pipes for Dismantling in all Four Areas is 38.4 m

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.8: Floors

Average Surface Area		Number		Percentage of Exposed Floor Area		Percentage of Floor Area for Decon	=	Estimated Surface Area of Floors for Decon
= 9.7 m^2	X	Number in Radiosynthesis Lab = 2	X	= 50%	X	= 15%	=	Radiosynthesis Lab = 1.5 m^2
= 3.3 m^2	X	Number in Waste Room = 1	X	= 50%	X	= 5%	=	Waste Room = 0.1 m^2
= 259.2 m^2	X	Number in Waste Facility = 1	X	= 50%	X	= 5%	=	Waste Facility = 6.5 m^2
= 324.0 m^2	X	Number in All Other Labs = 62	X	= 50%	X	= 5%	=	All Other Labs = 502.2 m^2

Total Surface Area of Floors for Decontamination in all Four Areas is 510.3 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.9: Walls

Average Surface Area		Number		Percentage of Exposed Wall Area		Percentage of Wall Area for Decon	=	Estimated Surface Area of Walls for Decon
= 5.4 m^2	X	Number in Radiosynthesis Lab = 8	X	= 50%	X	= 15%	=	Radiosynthesis Lab = 3.2 m^2
= 4.5 m^2	X	Number in Waste Room = 4	X	= 50%	X	= 5%	=	Waste Room = 0.5 m^2
= 39.3 m^2	X	Number in Waste Facility = 4	X	= 50%	X	= 5%	=	Waste Facility = 3.9 m^2
= 5.6 m^2	X	Number in All Other Labs = 248	X	= 50%	X	= 5%	=	All Other Labs = 34.7 m^2

Total Surface Area of Walls for Decontamination in all Four Areas is 42.3 m^2

Appendix 2.1: Calculation of the Number and Total Surface Area of Components Potentially Requiring Decontamination (Continued)

Section 2.1.10: Refrigerators and Freezers

Average Surface Area = 8.2 m^2	X	Number in Radiosynthesis Lab = 1	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 75%	=	Estimated Surface Area of Refrigerators for Decon in Radiosynthesis Lab = 6.2 m^2
Average Surface Area = 8.2 m^2	X	Number in Waste Room = 1	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 50%	=	Estimated Surface Area of Refrigerators for Decon in Waste Room = 4.1 m^2
Average Surface Area = 8.2 m^2	X	Number in Waste Room = 1	X	Percentage of Surface Area for Handling = 100%	X	Percentage of Surface Area for Decon = 50%	=	Estimated Surface Area of Refrigerators for Decon in Waste Room = 4.1 m^2
Average Surface Area = 8.2 m^2	X	Number in All Other Labs = 62	X	Percentage of Surface Area for Handling = 25%	X	Percentage of Surface Area for Decon = 10%	=	Estimated Surface Area of Refrigerators for Decon in All Other Labs = 12.7 m^2

Total Surface Area of Refrigerators for Decontamination in all Three Areas is 27.1 m^2

3.1 Decontaminating Components in Radiation Laboratories and Areas

As stated in Section 2.0 of this report, it is assumed that all components in radiation laboratories and areas, with the exception of sink drains and pipes, can be decontaminated. Decontamination of components in radiation laboratories and areas is based on reducing residual surface contamination to currently accepted NRC unrestricted release levels for the general public. Loose contamination can often be removed by normal cleaning techniques such as vacuuming, sweeping, brushing, wiping with a damp cloth or sponge, mopping with a damp mop, or scrubbing. Cleaning solutions such as non-hazardous detergents, commercial cleaning solutions, and a variety of chemicals are also used. Radioactive wastes resulting from these processes include cleaning solutions, paper products, protective clothing, plastics, rags, mops, scrub brushes and others.

All low-level radioactive liquid wastes generated during decontamination processes, provided that they are non-hazardous, readily dispersible, and will not cause effluent concentration and quantity limits to be exceeded, will be discharged in a manner consistent with acceptable health physics practices for disposal of radioactive liquids. This is currently an approved process at BIPI facilities.

Recommendations on the number of drums of solid waste generated as each component is decontaminated were based on experience in decontaminating similar components. Solid waste produced will be packed into 55-gallon (0.208-m^3) steel drums to allow compaction whenever possible. The only exception would be the dismantled drains and pipes, which would not typically be compactable.

3.1.1 Quantity of Wastes Resulting from Decontaminating Large Equipment

A total estimated surface area of 7.9 m^2 for the BIPI waste compactor is determined to require decontamination in Section 2.1.1 of this report. It is projected that decontamination of the waste compactor would produce approximately 0.3 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.1 m^3 (refer to Attachment 3.1 for calculations).

3.1.2 Quantity of Wastes Resulting from Decontaminating Glove Boxes

A total estimated surface area of 11.0 m^2 for BIPI glove boxes is determined to require decontamination in Section 2.1.2 of this report. It is projected that decontamination of the 1.50 glove boxes would produce approximately 0.4 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.1 m^3 (refer to Attachment 3.1 for calculations).

3.1.3 Quantity of Wastes Resulting from Decontaminating Fume Hoods

A total estimated surface area of 29.5 m^2 for BIPI fume hoods is determined to require decontamination in Section 2.1.3 of this report. It is projected that decontamination of 5.00 fume hoods would produce 1.3 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.3 m^3 (refer to Attachment 3.1 for

calculations).

3.1.4 Quantity of Wastes Resulting from Decontaminating Laboratory Benches

A total estimated surface area of 10.6 m^2 for BIPI laboratory benches is determined to require decontamination in Section 2.1.5 of this report. It is projected that decontamination of 7.60 laboratory benches would produce 1.5 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.3 m^3 (refer to Attachment 3.1 for calculations).

3.1.5 Quantity of Wastes Resulting from Decontaminating Floors

A total estimated surface area of 510.3 m^2 for BIPI floors is determined to require decontamination in Section 2.1.8 of this report. It is projected that decontamination of 1.75 floors would produce 0.9 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.2 m^3 (refer to Attachment 3.1 for calculations).

3.1.6 Quantity of Wastes Resulting from Decontaminating Walls

A total estimated surface area of 42.3 m^2 for BIPI walls is determined to require decontamination in Section 2.1.9 of this report. It is projected that decontamination of 7.00 walls would produce 1.8 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.4 m^3 (refer to Attachment 3.1 for calculations).

3.1.7 Quantity of Wastes Resulting from Decontaminating Sinks

A total estimated surface area of 5.6 m^2 for BIPI sinks is determined to require decontamination in Section 2.1.6 of this report. It is projected that decontamination of 4.30 sinks would produce 0.6 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.1 m^3 (refer to Attachment 3.1 for calculations).

3.1.8 Quantity of Wastes Resulting from Decontaminating Ventilation Ducts

A total estimated surface area of 27.2 m^2 for BIPI ventilation ducts is determined to require decontamination in Section 2.1.4 of this report. It is projected that decontamination of 8.0 ventilation ducts would produce 1.6 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.3 m^3 (refer to Attachment 3.1 for calculations).

3.1.9 Quantity of Wastes Resulting from Decontaminating Refrigerators

A total estimated surface area of 27.1 m^2 for BIPI refrigerators is determined to require decontamination in Section 2.1.10 of this report. It is projected that decontamination of 3.30 refrigerators would produce 0.8 drums of solid waste. Drums of solid waste were then converted into an equivalent volume of 0.2 m^3 (refer to Attachment 3.1 for calculations).

Table 3-1 summarizes all of the information developed in Section 3.1.

Table 3-1: Estimate of the Quantity of Solid Waste Produced from the Decontamination of Components in Radiation Laboratories and Areas

Component	Total # of Drums of Solid Waste	Total Volume of Solid Waste
Compactor	0.3	0.1 m^3
Glove Boxes	0.4	0.1 m^3
Fume Hoods	1.3	0.3 m^3
Laboratory Benches	1.5	0.3 m^3
Floors	0.9	0.2 m^3
Walls	1.8	0.4 m^3
Sinks	0.7	0.2 m^3
Ventilation Ducts	1.6	0.3 m^3
Refrigerators	0.8	0.2 m^3
Total	9	2 m^3

3.2 Dismantling Components in Radiation Laboratories and Areas

As stated in Section 3.1 of this report, pipes and drains will not be decontaminated but dismantled for disposal. Wrapping components in polyethylene or facilon may help to reduce the potential for the spread of contamination during packaging and shipment. Once components are dismantled and wrapped in polyethylene or facilon, they may require 20% more packing volume.

3.2.1 Quantity of Wastes Resulting from Dismantling Drains and Pipes

It is estimated that 12.8 drains and pipes at BIPI facilities require dismantling. In the process of dismantling drains and pipes, some solid waste may result from contamination control activities. It is estimated that 3.2 drums of solid waste would be produced with an equivalent volume of 0.7 m^3. In addition, the dismantled drains and pipes, once wrapped, will produce a total estimated volume of 0.001 m^3 or 0.01 drums. So the total estimated volume of waste produced from dismantling drains and pipes is 0.7 m^3 or 3.2 drums (refer to Appendix 3.2 for calculations).

Table 3-2 summarizes the volumes of waste produced from decontamination and dismantling developed in Sections 3.1 and 3.2.

Table 3-2: Estimates of the Total Volume of Waste Resulting from Decontaminating and Dismantling Radioactive Facility Components in Cubic Meters

Component	Volume of Waste from Decontamination	Volume of Waste from Dismantling	Total Volume of Waste
Compactor	0.1	0.0	0.1
Glove Boxes	0.1	0.0	0.1
Fume Hoods	0.3	0.0	0.3
Lab Benches	0.3	0.0	0.3
Sinks	0.1	0.0	0.1
Drains	0.0	0.7	0.7
Floors	0.2	0.0	0.2
Ventilation Ducts	0.3	0.0	0.3
Walls	0.4	0.0	0.4
Refrigerators	0.2	0.0	0.2
Total	2	1	3

Use of the waste compactor during decommissioning activities is assumed to reduce the volume of waste with a 2:1 compaction ratio. As such, the total number of steel drums of waste produced from decontamination and dismantling activities is 7. Table 3-3 presents a summary of the volume of waste and number of steel drums produced.

Table 3-3: Total Volume of Solid Waste and Number of 0.208 m^3 Steel Drums from Decontamination and Dismantling

	Uncompacted	Compacted
Volume of Solid Waste	3 m^3	2 m^3
Number of Steel Drums	14	7

3.3 Radioactive Waste Packaging

Primary reliance for safety in transportation of radioactive material is placed on packaging. Regulating the packaging of radioactive material is the responsibility of both the DOT and the NRC. Regulations prescribe general standards and requirements for all radioactive material packages, and for labelling, handling, and intermediate storage of those packages by carriers (49 CFR 173-180 and 10 CFR 71).

All sealed radioactive sources are assumed to be transferred to another NRC licensee prior to the start of decommissioning activities. As such, radioactivity encountered during decommissioning will be in the form of low-level radioactive contamination. All low-level radioactive waste will be shipped exclusive use, in strong-tight containers (i.e., 0.208 cubic meter steel drums). The cost of the drums is estimated to be approximately $40.00. Therefore, an estimated cost of $284.12 would result from the purchase of 7 drums.

3.4 Radioactive Waste Shipping

This section describes the costs of shipping of solid low-level radioactive wastes generated during decommissioning from BIPI Research and Development Complex to Barnwell, South Carolina. Costs of shipping low-level radioactive wastes are included in the cost of waste disposal from U.S. Ecology. However, BIPI is still required to maintain wipe test results for the exterior of the drums to demonstrate that there was no exterior surface contamination at the time of shipment.

3.5 Radioactive Waste Disposal

As of June 30, 1994, it is assumed that at a compact managed disposal facility the cost of compacted low-level radioactive waste consisting of laboratory trash (e.g., paper, plastic, glass) is approximately $6,000.00 per 55-gallon drum. The total cost of disposal of 7 drums of low-level radioactive waste is $42,617.39.

Table 3-4 summarizes all costs of packaging, shipping, and disposal.

Table 3-4: Total Estimated Cost of Packaging, Shipping, and Disposal of Low-Level Radioactive Waste

	Cost
Packaging	$284.12
Shipping and Disposal	$42,617.39
Total	$42,901.51

low estimate of RAD-WASTE (Volume)

Appendix 3.1: Calculation of the Quantity of Solid Waste Resulting from Decontamination of Components

Section 3.1.1: Large Equipment: Waste Compactor

Total Estimated Number Requiring Decon = 1.00	X	Estimated Number of Drums of Solid Waste Per Compactor = 0.25	=	Total Estimated Number of Drums of Solid Waste from Decon of Compactor = 0.3
Total Estimated Number of Drums of Solid Waste from Decon of Compactor = 0.3	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Compactor = 0.1 m^3

Section 3.1.2: Glove Boxes

Total Estimated Number Requiring Decon = 1.50	X	Estimated Number of Drums of Solid Waste Per Glove Box = 0.25	=	Total Estimated Number of Drums of Solid Waste from Decon of Glove Boxes = 0.4
Total Estimated Number of Drums of Solid Waste from Decon of Glove Boxes = 0.4	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Glove Boxes = 0.1 m^3

Section 3.1.3: Fume Hoods

Total Estimated Number Requiring Decon = 5.00	X	Estimated Number of Drums of Solid Waste Per Fume Hood = 0.25	=	Total Estimated Number of Drums of Solid Waste from Decon of Fume Hoods = 1.3
Total Estimated Number of Drums of Solid Waste from Decon of Fume Hoods = 1.3	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Fume Hoods = 0.3 m^3

Section 3.1.4: Laboratory Benches

Total Estimated Number Requiring Decon = 7.6	X	Estimated Number of Drums of Solid Waste Per Lab Bench = 0.20	=	Total Estimated Number of Drums of Solid Waste from Decon of Lab Benches = 1.5
Total Estimated Number of Drums of Solid Waste from Decon of Lab Benches = 1.5	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Lab Benches = 0.3 m^3

Appendix 3.1: Calculation of the Quantity of Solid Waste Resulting from Decontamination of Components (Continued)

Section 3.1.5: Floors

Total Estimated Number Requiring Decon = 1.8	X	Estimated Number of Drums of Solid Waste Per Floor = 0.50	=	Total Estimated Number of Drums of Solid Waste from Decon of Floors = 0.9
Total Estimated Number of Drums of Solid Waste from Decon of Floors = 0.9	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Floors = 0.2 m^3

Section 3.1.6: Walls

Total Estimated Number Requiring Decon = 7.0	X	Estimated Number of Drums of Solid Waste Per Wall = 0.25	=	Total Estimated Number of Drums of Solid Waste from Decon of Walls = 1.8
Total Estimated Number of Drums of Solid Waste from Decon of Walls = 1.8	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Walls = 0.4 m^3

Section 3.1.7: Sinks

Total Estimated Number Requiring Decon = 4.3	X	Estimated Number of Drums of Solid Waste Per Sink = 0.15	=	Total Estimated Number of Drums of Solid Waste from Decon of Sinks = 0.7
Total Estimated Number of Drums of Solid Waste from Decon of Sinks = 0.7	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Sinks = 0.2 m^3

Section 3.1.8: Ventilation Ducts

Total Estimated Number Requiring Decon = 8.0	X	Estimated Number of Drums of Solid Waste Per Duct = 0.20	=	Total Estimated Number of Drums of Solid Waste from Decon of Ducts = 1.6
Total Estimated Number of Drums of Solid Waste from Decon of Ducts = 1.6	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Ducts = 0.3 m^3

Appendix 3.1: Calculation of the Quantity of Solid Waste Resulting from Decontamination of Components (Continued)

Section 3.1.9: Refrigerators

Total Estimated Number Requiring Decon = 3.3	X	Estimated Number of Drums of Solid Waste Per Refrigerator = 0.25	=	Total Estimated Number of Drums of Solid Waste from Decon of Refrigerators = 0.8
Total Estimated Number of Drums of Solid Waste from Decon of Refrigerators = 0.8	X	Volume of One Drum = 0.208 m^3	=	Total Estimated Volume of Solid Waste from Decon of Refrigerators = 0.2 m^3

Appendix 3.2: Calculation of the Quantity of Solid Waste and Dismantled Components Resulting from Dismantling of Components

Section 3.2.1: Drains and Pipes

Estimation of Solid Waste Generation During Dismantling

Total Estimated Number Requiring Dismantling = 12.8 **X** Estimated Number of Drums of Solid Waste Per Drain and Pipe = 0.25 **=** Total Estimated Number of Drums of Solid Waste from Dismantling Drains and Pipes = 3.2

Total Estimated Number of Drums of Solid Waste from Dismantling Drains and Pipes = 3.2 **X** Volume of One Drum = 0.208 m^3 **=** Total Estimated Volume of Solid Waste from Dismantling Drains and Pipes = 0.7 m^3

Estimation of Dismantled Components Generated During Dismantling

Total Volume for Dismantling = 0.001 m^3 **+** 20% Packing Volume **=** Total Volume for Disposal = 0.001 m^3

Total Volume for Disposal = 0.001 m^3 **÷** Volume of One drum = 0.208 m^3 **=** Total Estimated Number of Drums of Dismantled Drains and Pipes = 0.01

Total Volume of Solid Waste and Dismantled Drains and Pipes Generated During Dismantling

Total Estimated Volume of Solid Waste from Dismantling Drains and Pipes = 0.7 m^3 **+** Total Volume of Dismantled Drains and Pipes = 0.001 m^3 **=** Total Volume for Disposal = 0.7 m^3

Total Estimated Number of Drums of Solid Waste from Dismantling Drains and Pipes = 3.2 **+** Total Estimated Number of Drums of Dismantled Drains and Pipes = 0.01 **=** Total Estimated Number of Drums of Solid Waste and Dismantled Drains and Pipes = 3.2

BIPI currently has no methods or practices where a potential exists for contamination to reach the soils surrounding the Research and Development facility that would require remediation. The prospect of soil contamination has been reviewed and due to strict FDA requirements on research studies, BIPI is certain that no contamination has reached outside the facility. BIPI ensures that all material is contained within the facility for laboratory use only and rigorously monitors and control effluents. However, BIPI is aware of the following steps involved in the estimation of remediation costs:

- Radiological survey: site remediation activities begin with a radiological survey to evaluate radiological conditions. This survey provides data upon which to base decisions about remedial measures needed to protect the public and the environment.

- Exhume contaminated soil: contaminated soil removal involves the removal, packaging, shipment, and burial of contaminated soil at an approved shallow-land disposal site. Removal of contaminated soil would be accomplished with standard earthmoving equipment and techniques.

- Package, transport and dispose of contaminated soil: radioactively contaminated soil should be packaged in plastic-lined 208-liter drums.

- Final site survey: a final site radiological survey will be performed prior to release of a site for unrestricted use to verify that any radioactivity remaining on the site is below limits specified for unrestricted release.[1] Soil samples will be obtained by a health physics technician, prepared and sent for analysis.

- Site restoration: after all contaminated soil is removed and packaged for disposal, the site should be backfilled with new soil, compacted, and graded. Revegetation will be used to control wind and water erosion of the ground surface. A variety of vegetation types and species could be used, depending on the soil and climate conditions and also on the desired results.

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[1]NRC Regulatory Guide 8.23, op cit, p. 8.23-9.

5.1 Components of the Final Radiation Survey

5.1.1 Measurements with Survey Instruments

Measurements of all building surfaces exposed during decontamination or dismantling should be performed with appropriate hand-held survey instruments to determine residual levels of radioactive contamination. All residual levels of radioactive contamination must be below NRC unrestricted release levels before decommissioning is complete.

Radionuclides in use at BIPI facilities primarily emit one or more of the following types of radiations: beta particles and gamma rays. However, the possibility of having some alpha emitters should not be ruled out (i.e., uranium microscopy stains, etc.). The probes and detectors listed in Table 5-1 are typically used with counting rate meters to measure the total surface contamination for these radiations. It is recommended that to ensure detection of radioactive contamination by direct hand-held monitoring, the velocity of probe over a contaminated surface should not exceed 5 cm/sec.

Table 5-1: Typical Radiation Survey Instruments Commonly Used to Detect Alpha, Beta, and Gamma Radiations

Radiation	Survey Instrument
Alpha	Zinc Sulfide Scintillation Probe Air Proportional Counter (not recommended) Gas-Flow Proportional Counter "Pancake" Geiger-Mueller Probe
Beta	Anthracene or Plastic Scintillation Probe "Pancake" Geiger-Mueller Probe Ionization Chamber Gas-Flow Proportional Counter
Gamma	Sodium Iodide Scintillation Probe Energy Compensated Geiger-Mueller Probe (for exposure rate) Ionization Chamber

Portable counters of several types can be used to detect beta contamination on surfaces. The most commonly used detector of beta radiation is the "pancake" Geiger-Mueller (G-M) probe coupled with a count-rate meter. Portable G-M counters generally cannot be used to detect tritium contamination because the beta energy is too low to allow the particle to enter the detector. Wipe tests are the usual means of surveying for tritium contamination of surfaces and will be discussed in the next section. Since most beta emitters also emit gamma rays, many monitoring instruments are made to detect both radiations. The G-M probe described previously does respond to all radiations. However, it is not very efficient for detection of pure low energy photon emitters typically used in the pharmaceutical research and development environment (e.g., Iodine-125). In

this case a thin sodium iodide solid scintillation probe is recommended.

5.1.2 Wipe Tests

Wipe tests are performed to determine levels of removable contamination on surfaces and equipment. In Regulatory Guide 8.23,[1] the NRC defines removable contamination as "radioactivity that can be transferred from a surface to a smear [wipe] test paper by rubbing with moderate pressure." They also explain, "a standardized method for smear [wipe] testing of a relatively uniform area should be used in order to allow comparison of relative levels of contamination at different times and places. A dry smear taken from an area of about 100 cm^2 is acceptable to indicate levels of removable contamination."

Following is an example of a standardized method for wipe testing recommended by the NRC in NUREG/CR-1754.[2] To conduct a wipe test for removable contamination:

- obtain small pieces of paper, such as discs of filter paper;
- rub a piece of the filter paper over the surface of the item to pick up any removable radioactivity; and
- examine wipe tests for different types of radiation by using simple counting room techniques with an appropriate instrument (refer to Table 5-2).

In that liquid scintillation counting will detect all radiations at quite good efficiencies for all radionuclides (including tritium and carbon-14), it is recommended that all final wipes be evaluated by this method. Other instrumentation such as survey meters with various probes can be utilized for decontamination efforts in the field.

5.1.3 Termination Survey Report

According to the NRC in NUREG/CR-1754,[3] the results of the final radiation survey are to be communicated to the NRC in a report entitled the "Termination Survey Report." Its purpose is to establish that the contamination remaining on the premises is within the limits specified in the NRC guidelines. The termination survey report shall:

- identify the premises;
- show the reasonable effort has been made to eliminate residual contamination;
- describe the scope of the final radiation survey and the general procedures followed; and
- state the findings of the final radiation survey.

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[1] NRC Regulatory 8.23, op cit, p. 8.23-3.
[2] NUREG/CR-1754, op cit, pp. C-16-C-17.
[3] NUREG/CR-1754, op cit, pp. 4-14, 4-15.

Table 5-2: Sample Counters for Assay of Wipes for Removable Contamination

Counter Type	Radiation Detected
Geiger-Mueller	Alpha Beta Gamma- photons
Gas-Flow Proportional Counter	Alpha Beta Gamma- photons
NaI(Tl) Scintillation Detector Well or Standard Crystal	Gamma- photons X-Ray- photons
ZnS Scintillation Detector	Alpha
Liquid Scintillation Counter	Alpha Beta Gamma- photons X-Ray- photons
Semi-Conductor Detector	Gamma- photons X-Ray- photons

BIPI understands that the NRC will review each of the sections found in the report to determine if the site has been successfully decommissioned. BIPI also understands that the NRC will not terminate the radioactive material license until they are satisfied that all levels of residual radioactive contamination are below currently accepted contamination release levels. Such release levels are provided in NRC Regulatory Guide 8.23.[4]

5.2 Cost of the Final Radiation Survey

The cost of the final radiation survey is based primarily on employee time involved in conducting the survey and use of in-house counting equipment. An accurate estimate of the radiological condition of the laboratories and areas where radioactive materials had been used must be conducted to demonstrate that residual radioactivity is below currently accepted contamination release levels.

[4] NRC Regulatory Guide 8.23, op cit, p. 8.23-9.

The final radiation survey team should consist of a supervisor, a health physicist, and a health physics technician. It is assumed that the team would require approximately the same amount of time for the final radiation survey as calculated for the amount of time to monitor for compliance, reclean and remonitor facilities in Section 2.2.11 of this report. A summary of the costs developed in this section is found in Table 5-3.

Table 5-3: Cost of the Final Radiation Survey

Final Survey	Man-Days	Cost
Supervisor	0.9	$311.54
Health Physicist	0.9	$436.15
HP Technician	11.1	$2,689.62
Total	12.9	$3,437.31

This report presents all of the information necessary to complete the Decommissioning Cost Estimate for BIPI facilities. Following the Introduction, there were six sections, each containing interrelated information needed to determine the final decommissioning cost estimate.

Section 1 of this report, "Estimates of the Time Required for Planning and Preparation of the Decommissioning Plan," involved estimating annual salaries for a list of positions commonly required during a decommissioning effort. These salaries were used in later sections to develop further manpower estimates. Then, projections of the amount of time it would take for an supervisor, health physicist, health physics technician and secretary to complete the following tasks were developed: preparation of documentation for regulatory agencies; submittal of a decommissioning plan to the NRC; development of work plans; procurement of special equipment; staff training; and characterization of the radiological condition of the facility.

In Section 2 of this report, "Estimates of Decontamination and Dismantling Costs," the numbers and sizes of laboratories, areas, and facility components that could require decontamination or dismantling were estimated. Then, the quantity and cost of special equipment and supplies that would be required for decommissioning were estimated. Finally, using the salary estimates developed in Section 1, projections of the time and costs for an supervisor, technician, health physicist, and craftsperson to complete the following tasks were estimated: decontaminate or dismantle laboratory fume hoods, glove boxes, benches, sinks, refrigerators, sink drains and pipes, ventilation systems, waste compactor; and monitoring for compliance, recleaning, and remonitoring.

The estimates of decontaminated and dismantled components developed in Section 2 were directly related to the estimates of packaging, shipping, and disposal provided in Section 3. In this section, the number and volume of radioactive waste containers needed for packaging, shipping, and disposal of all radioactive facility and area components which were decontaminated or dismantled were provided. These quantities were then used to determine the cost of packaging, shipping, and disposal of solid radioactive waste and dismantled components from BIPI Research and Development complex to the Barnwell Nuclear Burial Site, a low-level radioactive waste disposal facility located in Barnwell, South Carolina.

Although BIPI does not have a site which requires remediation, for informational purposed only, alternatives for a site containing soil contamination were explained in Section 4 of this report, "Estimate Remediation Costs." Contaminated soil removal was assumed to be the best method to use. After all contaminated soil is removed from the site, a final radiation survey should be conducted demonstrating that residual levels of radioactive contamination are below currently accepted NRC release limits. Site restoration or backfilling and revegetation completes site remediation activities.

The importance of a final radiation survey, conducted once decontamination and decommissioning of a facility is complete, is discussed in Section 5 of this report, "Prepare Final Survey Estimates." The purpose of this survey is to demonstrate that residual levels of radioactive contamination at BIPI Research and Development complex

are below currently accepted NRC release limits. This survey should consist of conducting hand-held meter surveys and taking wipe samples for analysis of residual levels of radioactive contamination.

Based on this analysis of the BIPI Research and Development complex, it is estimated that the cost of decommissioning all facilities would be approximately $96,903.10. This cost included all steps in the decommissioning process as described in Section 1-5 of this report. The NRC recommends the addition of a contingency factor of 25% to account for any unexpected costs associated with decommissioning. The total cost of decommissioning all facilities including the contingency is $121,128.87. A summary of all decommissioning costs is presented in Table 6-1.

Table 6-1: Summary of Decommissioning Cost Estimate

Section #	Description	Cost Estimate
1	Estimates of Time Required for Planning and Preparation of the Decommissioning Plan	$34,061.54
2	Estimates of Decontamination and Dismantling Costs	$16,611.79
3	Estimates of Packaging, Shipping, and Disposal Costs	$42,901.51
4	Estimate Remediation Costs	$0.00
5	Prepare Final Survey Estimates	$3,437.31
Subtotal		$96,903.10
	Additional 25% Contingency	$24,225.77
Total		$121,128.87

NUREG/CR-1754 "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities," Pacific Northwest Laboratory for the U.S. Nuclear Regulatory Commission, February 1981.

NUREG/CR-1754, Addendum 1, "Technology, Safety and Costs of Decommissioning Reference Non-Fuel-Cycle Nuclear Facilities, Compendium of Current Information," Pacific Northwest Laboratory for the U.S. Nuclear Regulatory Commission, October 1989.

NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination," Oak Ridge Associated Universities, June 1992.

U.S. Nuclear Regulatory Commission Regulatory Guide 3.65 "Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70," U.S. Nuclear Regulatory Commission, August 1989.

U.S. Nuclear Regulatory Commission Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72," U.S. Nuclear Regulatory Commission, June 1990.

U.S. Nuclear Regulatory Commission Regulatory Guide 8.23 "Radiation Safety Surveys at Medical Institutions," U.S. Nuclear Regulatory Commission, January, 1981.

Arthur D Little

Amsterdam
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Cambridge, U.S.A.
Caracas
Gothenburg
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Citibank, N.A.

NORTH AMERICAN TRADE FINANCE

MARCH 31, 1994

U.S. NUCLEAR
REGULATORY COMMISSION
WASHINGTON, DC 20555

REF: IRREVOCABLE LETTER OF CREDIT NO. NY-00764-30014980

GENTLEMEN:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. NY-00764-30014980 IN YOUR FAVOR, AT THE REQUEST AND FOR THE ACCOUNT OF BOEHRINGER INGELHEIM PHARMACEUTICALS, INC. ("BIPI"), 900 RIDGEBURY ROAD, RIDGEFIELD, CT 06877 UP TO THE AGGREGATE AMOUNT OF TWO HUNDRED THOUSAND AND 00/100 U.S. DOLLARS (US $200,000.00), AVAILABLE UPON PRESENTATION OF:

1. YOUR SIGHT DRAFT DRAWN ON US BEARING REFERENCE TO THIS LETTER OF CREDIT NO. NY-00764-30014980, AND

2. YOUR SIGNED STATEMENT READING AS FOLLOWS: "I CERTIFY THAT THE AMOUNT OF THE DRAFT IS PAYABLE PURSUANT TO REGULATIONS ISSUED UNDER AUTHORITY OF THE U.S. NUCLEAR REGULATORY COMMISSION."

WE ARE ADVISED THAT THIS LETTER OF CREDIT IS ISSUED IN ACCORDANCE WITH THE REGULATIONS ISSUED UNDER THE AUTHORITY OF THE U.S. NUCLEAR REGULATORY COMMISSION (NRC), AN AGENCY OF THE U.S. GOVERNMENT, PURSUANT TO THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, AND THE ENERGY REORGANIZATION ACT OF 1974. THE NRC HAS PROMULGATED REGULATIONS IN TITLE 10, CHAPTER I OF THE CODE OF FEDERAL REGULATIONS, PART 30, WHICH REQUIRE THAT A HOLDER OF, OR AN APPLICANT FOR, A LICENSE ISSUED UNDER 10 CFR PART 30 PROVIDE ASSURANCE THAT FUNDS WILL BE AVAILABLE WHEN NEEDED FOR DECOMMISSIONING.

THIS LETTER OF CREDIT IS EFFECTIVE AS OF APRIL 1,1994 AND SHALL EXPIRE ON APRIL 1,1995 BUT SUCH EXPIRATION DATE SHALL BE AUTOMATICALLY EXTENDED, WITHOUT AMENDMENT, FOR A PERIOD OF ONE YEAR ON APRIL 1,1995 AND ON EACH SUCCESSIVE EXPIRATION DATE, UNLESS AT LEAST 90 DAYS BEFORE THE CURRENT EXPIRATION DATE, WE NOTIFY BOTH YOU AND BIPI BY CERTIFIED MAIL, AS SHOWN ON THE SIGNED RETURN RECEIPTS, THAT WE ELECT NOT TO EXTEND THE EXPIRATION DATE FOR ANY FURTHER PERIOD. IF BIPI IS UNABLE TO SECURE ALTERNATIVE FINANCIAL ASSURANCE TO REPLACE THIS LETTER OF CREDIT WITHIN 30 DAYS OF NOTIFICATION OF CANCELLATION, THE NRC MAY DRAW UPON THE FULL VALUE OF THIS LETTER OF CREDIT PRIOR TO CANCELLATION. THE BANK SHALL GIVE IMMEDIATE NOTICE TO THE APPLICANT AND THE NRC OF ANY NOTICE RECEIVED OR ACTION FILED

SEE NEXT PAGE

ALLEGING (1) ITS INSOLVENCY OR BANKRUPTCY OR (2) ANY VIOLATIONS OF REGULATORY REQUIREMENTS THAT COULD RESULT IN SUSPENSION OR REVOCATION OF THE BANK'S CHARTER OR LICENSE TO DO BUSINESS. THE ISSUING BANK ALSO SHALL GIVE IMMEDIATE NOTICE IF THEY, FOR ANY REASON, BECOME UNABLE TO FULFILL THEIR OBLIGATION UNDER THE LETTER OF CREDIT.

WHENEVER THIS LETTER OF CREDIT IS DRAWN ON UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS LETTER OF CREDIT, WE SHALL DULY HONOR SUCH DRAFT UPON ITS PRESENTATION TO US WITHIN 30 DAYS, AND WE SHALL DEPOSIT THE AMOUNT OF THE DRAFT DIRECTLY INTO THE STANDBY TRUST FUND OF BIPI IN ACCORDANCE WITH YOUR INSTRUCTIONS.

EACH DRAFT MUST BEAR ON ITS FACE THE CLAUSE: "DRAWN UNDER LETTER OF CREDIT NO. NY-00764-30014980 DATED MARCH 31,1994, AND THE TOTAL OF THIS DRAFT AND ALL OTHER DRAFTS PREVIOUSLY DRAWN UNDER THIS LETTER OF CREDIT DOES NOT EXCEED U.S. DOLLARS $200,000.00."

THIS LETTER OF CREDIT IS SUBJECT TO THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (1993 REVISION) INTERNATIONAL CHAMBER OF COMMERCE BROCHURE #500, SHALL BE DEEMED TO BE A CONTRACT MADE UNDER, AND AS TO MATTERS NOT GOVERNED BY THE UCP, SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK AND APPLICABLE U.S. FEDERAL LAW.

CITIBANK N.A.

Joseph Jaklitsch

AUTHORIZED SIGNATURE.

JOSEPH JAKLITSCH, S.O.
North American Trade Services
111 Wall St., 15th Fl. Zone 9
(212) 657-9554

STANDBY TRUST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of April 1, 1994, by and between Boehringer Ingelheim Pharmaceuticals, Inc., a Delaware corporation located in Ridgefield, Connecticut, herein referred to as the "Grantor, " and Union Trust Company, a Connecticut corporation located in Stamford, Connecticut, herein referred to as the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 30. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a Part 30 license provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a letter of credit to provide all of such financial assurance for the facilities identified herein; and

WHEREAS, when payment is made under a letter of credit, this standby trust shall be used for the receipt of such payment; and WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number 06-19183-01, issued pursuant to 10 CFR, Part 30, herewith attached as **Exhibit A.**

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a standby trust fund (the Fund) for the benefit of the NRC. The Grantor and the Trustee intend that no third party have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in **Exhibit B** attached hereto. Such property and any other property subsequently transferred to the

Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by the NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

a. A certificate duly executed by the Senior Vice President of the Grantor attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate, as **Exhibit C** herewith, and

b. A certificate attesting to the following conditions;

(1) that decommissioning is proceeding pursuant to an NRC-approved plan.

(2) that the funds withdrawn will be expended for activities undertaken pursuant to that Plan, and

(3) that the NRC has been given 30 days' prior to notice of Grantor's intent to withdraw funds from the escrow fund.

No withdrawal from the fund can exceed twenty percent (20) of the outstanding balance of the Fund or $40,000, whichever is greater, unless NRC approval is attached.

In the event of the Grantor's default or inability to direct decommissioning activities, the Trustee shall make payments from the Fund as the NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the NRC, from the Fund for expenditures for required activities in such amounts as the NRC, or State agency, shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and the income of the Fund and keep the Fund invested as a single fund, without distinction between

principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal Government, and in obligations of the Federal Government such as GNMA, FNMA, and FHLM bonds and certificates or State and Municipal bonds rated BBB or higher by Standard and Poors or Baa or higher by Moody's Investment Services; and

(c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-1 et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and direction conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is

expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and the NRC or to reinvest in securities at the direction of the Grantor;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this standby trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the standby trust fund, furnish to the Grantor and to the NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the NRC, shall constitute a conclusively binding assent by the Grantor, barring the grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing with the Grantor. (See **Exhibit D** herewith attached.)

Section 13. Successor Trustee. Upon 90 days notice to the NRC, the Trustee may resign; upon 90 days notice to the NRC and the Trustee, the Grantor may replace the Trustee; but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee and this successor accepts the appointment. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor Trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor or the NRC and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the grantor's orders, requests, and instructions. If the NRC issues orders, requests, or

instructions to the Trustee these shall be in writing, signed by the NRC, or their designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor, the NRC, hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instruction from the Grantor and/or the NRC, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee and the NRC, or by the Trustee and the NRC, if the Grantor ceases to exist.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the NRC, or by the Trustee and the NRC, if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the Grantor or the NRC, issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. Applicable Law. This Agreement shall be administered, construed, and enforced according to the laws of the State of Connecticut.

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the

date first written above.

ATTEST:

Boehringer Ingelheim
Pharmaceuticals, Inc.;
GRANTOR

Allyn M. Carnam

R. C. Cummings
Vice President, Finance

Title: Senior Attorney

[SEAL]

ACKNOWLEDGEMENT

STATE OF CONNECTICUT)
) ss: Ridgefield
COUNTY OF)

On this 4th day of April, 1994; before me, a notary public in and for the city and State aforesaid, personally appeared R. C. Cummings, and he did depose and say that he is the Vice President, Finance, of Boehringer Ingelheim Pharmaceuticals, Inc., a corporation, the **Grantor**, which executed the above instrument, that he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the corporation; and that he signed his name thereto by like order.

[Signature of notary public]

My Commission Expires: June 30, 1996
[Date]

S:\landby\T.agr

ATTEST: Robert G. Olson

UNION TRUST COMPANY
TRUSTEE

~~Vice President~~ Trust Officer

Arnold A. Pietola

Title: Trust Officer

[Insert name and title of representative] Arnold A. Pietola
Vice President

[Seal]

ACKNOWLEDGEMENT

STATE OF CONNECTICUT)
) ss: Stamford
COUNTY OF Fairfield)

On this 5th day of April; before me, a notary public in and for the city and State aforesaid, personally appeared Arnold A. Pietola, and ~~she~~/he did depose and say that ~~she~~/he is the Vice President, of Union Trust Company, a Conn. Corp, the Trustee, which executed the above instrument, that ~~she~~/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the Corporation; and that ~~she~~/he signed ~~her~~/his name thereto by like order.

Rita M Massmann
[Signature of notary public]

My Commission Expires: RITA M. MASSMANN NOTARY PUBLIC MY COMM. EXPIRES MARCH 31, 1995
[Date]

StandbyT.agr

MATERIALS LICENSE

Amendment No. 09

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Boehringer Ingelheim Pharmaceuticals, Inc.	In accordance with the letter dated March 23, 1993, 3. License number 06-19183-01 is amended in its entirety to read as follows:
2. 900 Ridgebury Road P.O. Box 368 Ridgefield, Connecticut 06877-0368	4. Expiration date May 31, 1991 (Extended)
	5. Docket or Reference No 030-17101

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Any byproduct material with Atomic Numbers 1 through 83	A. Any	A. Not to exceed 50 millicuries per radionuclide and 1 curie total
B. Hydrogen 3	B. Any	B. 25 curies
C. Carbon 14	C. Any	C. 4 curies
D. Phosphorus 32	D. Any	D. 100 millicuries
E. Sulfur 35	E. Any	E. 100 millicuries
F. Nickel 63	F. Foils or plated sources	F. Not to exceed 15 millicuries per source and 100 millicuries total
G. Cesium 137	G. Sealed source (J.L. Shepherd No. JLS:6810)	G. 6000 curies

9. Authorized use

A. through E. Research and development as defined in 10 CFR 30.4, and manufacturing of labelled compounds and for distribution to persons authorized to receive licensed material pursuant to the terms and conditions of a specific license issued by the Nuclear Regulatory Commission or an Agreement State.

F. In gas chromatographs for sample analysis.

G. In a J. L. Shepherd Mark I, Model 68-1 Irradiator for the irradiation of small animals, isolated cells and associated research and development.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities at the Research and Development Center, Briar Ridge Road, Ridgefield, Connecticut and Production Plant, Briar Ridge Road, Danbury, Connecticut.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 06-19183-01

Docket or Reference number: 030-17101

Amendment No. 09

(Continued) CONDITIONS

11. A. Licensed material shall be used by, or under the supervision of, individuals designated by the licensee's Radiation Safety Committee, James J. Keirns, Ph.D., Chairman.

B. The Radiation Safety Officer for this license is Vincent D. Chase.

12. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed 3 years.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

C. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen 3; or

(ii) they contain only a gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

(12. continued) CONDITIONS

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

13. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in 10 CFR 20.203(a)(1), the licensee is hereby authorized to label detector cells and cell baths, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols.

14. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 3 years from the date of each inventory.

15. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders or detector cells by the licensee.

16. The licensee shall not acquire licensed material in a sealed source or in a device that contains a sealed source unless the source or device has been registered with the Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State.

17. The licensee shall not use licensed material in or on human beings or in field applications where activity is released except as provided otherwise by specific condition of this license.

18. Experimental animals administered licensed materials or their products shall not be used for human consumption.

19. The licensee may transport licensed material in accordance with the provisions of 10 CFR 71, "Packaging and Transportation of Radioactive Material."

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
06-19183-01

Docket or Reference number
030-17101

Amendment No. 09

(Continued) CONDITIONS

20. The licensee shall not perform repairs or alterations of the irradiator involving removal of shielding or access to the licensed material. Removal, replacement, and disposal of sealed sources in the irradiator shall be performed by a person specifically licensed by the Commission or an Agreement State to perform such services.

21. For each J. L. Shepherd and Associates, Mark I Cesium 137 Irradiator, the licensee shall:

A. Permit use only with a calibrated and operable radiation survey meter or room monitor available; and

B. Permit the irradiator door to be opened only if the operator has checked visual indicators to verify that the source has returned to its safe storage position; and

C. Have room monitors installed that will:

(i) Operate at all times when the irradiator is in use; and

(ii) Activate a visible and audible alarm when radiation exceeds 2 millirems per hour; and

(iii) Detect any radiation escaping from the irradiator door; and

(iv) Be visible to the irradiator user when he is next to the irradiator; or

D. If a room monitor is not installed, have an operable survey meter which will be used:

(i) To determine the radiation level at the irradiation door when the door is closed; and

(ii) To check for any increase in radiation levels each time the irradiator door is opened.

E. Immediately stop the use of the irradiator and notify the NRC, Region I, by telephone if any abnormal levels of radiation or any malfunction of the irradiator is detected;

F. Not repair or authorize others to attempt repair of the irradiator except as specifically authorized in a license issued by NRC or an Agreement State.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
06-19183-01

Docket or Reference number
030-17101

Amendment No. 09

(Continued) CONDITIONS

22. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application received August 27, 1985
B. Letter dated April 29, 1986
C. Letter dated June 11, 1990
D. Letter dated October 10, 1990
E. Letter dated November 6, 1991
F. Letter dated January 28, 1992
G. Letter dated March 10, 1992
H. Letter dated July 23, 1992
I. Letter dated October 1, 1992

For the U.S. Nuclear Regulatory Commission

Date JUL 09 1993

By _____
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

TRUST AGREEMENT SCHEDULE

SCHEDULE B

This Agreement demonstrates financial assurance for the following cost estimates for the following licensed activities:

U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO.	NAME AND ADDRESS OF LICENSEE	ADDRESS OF LICENSED ACTIVITY	COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT
06-19183-01	Boehringer Ingelheim Pharmaceuticals, Inc.	Ridgefield, Connecticut	$200,000

The cost estimates listed here were last adjusted and approved by the NRC on or about _____.*

---

* To be completed by the NRC.

TRUST AGREEMENT SCHEDULE

SCHEDULE C

Specimen Certificate of Events

Union Trust Company
300 Main Street
P.O. Box 700
Stamford, Connecticut 06904
Attention: Trust Division

Gentlemen:

In accordance with the terms of the Agreement with you dated April 1, 1994, I, R. C. Cummings, Vice President, Finance of Boehringer Ingelheim Pharmaceuticals, Inc., hereby certify that the following events have occurred:

1. Boehringer Ingelheim Pharmaceuticals, Inc. is required to commence the decommissioning of its facility located at Ridgefield, Connecticut (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on _____ (copy of approval attached).

3. The Board of Directors of Boehringer Ingelheim Pharmaceuticals, Inc. has adopted the attached resolution authorizing the commencement of the decommissioning.

_____
Vice President, Finance

_____
Date

TRUST AGREEMENT SCHEDULE

SCHEDULE D

AMOUNT $200,000

AS EVIDENCED BY Irrevocable Letter of Credit No. NY-00764-300/4980

Boehringer Ingelheim Pharmaceuticals, Inc. shall pay to the Bank, in advance, a set-up fee of $2,500 and an annual fee of $500, provided, however, Boehringer Ingelheim Pharmaceuticals, Inc. shall pay the Bank an annual fee, in accordance with the Bank's published custodial account fee schedule, if the aforementioned letter of credit is required to be drawn down.

BIPI120

BOEHRINGER INGELHEIM PHARMACEUTICALS, INC.

UNANIMOUS WRITTEN CONSENT OF DIRECTORS

The undersigned, being all of the members of the Board of Directors of Boehringer Ingelheim Pharmaceuticals, Inc., a Delaware corporation, do hereby adopt the following resolutions by this our unanimous written consent without a meeting pursuant to Section 141(f) of the General Corporation Law of the State of Delaware, with full force and effect as if adopted by the unanimous affirmative vote of all of us at a duly constituted meeting:

> RESOLVED that, the officers of this Corporation shall be required to obtain the prior approval of this Board of Directors for any transaction for or in the name of this Corporation of any of the following categories:
>
> 1. purchasing, selling, leasing and/or exchanging real estate or other fixed assets designated as Class A investments in the Invest-Procedure dated May, 1987, a copy of which is attached hereto and made a part hereof, and those designated therein as Class B1 and B2 investments if the latter have not been previously set forth in an approved Budget;
>
> 2. acquiring, selling and licensing patents, production know-how and trademarks;
>
> 3. hiring, dismissing and altering the salaries or other employment conditions of the chief operating officer of this Corporation and the officers and department directors which report directly to the chief operating officer;
>
> 4. payments of termination compensation in connection with the termination of employment in an amount which exceeds the annual salary of the terminated employee. Payments of salaries during the period beginning when notice of termination is given and ending when employment actually ceases are not considered termination compensation;

5. establishing a pension plan or entering into pension obligations exceeding those under the currently adopted pension plans or changing existing pension plans unless required by law;

6. establishing and changing guidelines for loans to employees and granting loans to employees in excess of the scope of such guidelines;

7. granting loans to parties other than this Corporation's U.S. affiliates, placing time deposits and carrying out foreign currency transactions other than in the normal course of business;

8. purchasing and selling shares and securities;

9. acquiring and selling enterprises or parts thereof;

10. establishing connections with banks which are active on an international basis;

11. borrowing money from unaffiliated parties, regardless of source, and providing security for unaffiliated creditors;

12. entering into obligations of guarantee and security for the debts of unaffiliated parties;

13. assuming liability for bills/promissory notes except those arising in the normal course of business settlement;

14. adopting the strategic plan, and the budget;

15. effecting changes in the Organization Plan which result in the reassignment of a major departmental function to another department;

16. concluding or terminating contracts and agreements not in the normal course of business;

17. introducing a new drug, i.e., a drug containing a new active ingredient, or consisting of a new combination, strength or delivery system, as the first company of Boehringer Ingelheim worldwide; abandoning the production and/or distribution of products to the extent not already covered by these resolutions;

18. initiating lawsuits or arbitration proceedings of any kind except for the collection of outstanding debts and those not having significant importance;

19. appointing or dismissing, as shareholder, the directors of the Boards of any subsidiary or affiliated corporation;

20. appointing new outside auditors, changing outside auditors or not appointing outside auditors;

21. purchasing insurance coverage for General Liability or Product Liability at premiums that are higher or at limits that are lower than those specifically set forth in an approved budget; and

22. other transactions, if any, for which board of directors approval is legally required.

RESOLVED that, these resolutions shall supersede any and all previously adopted resolutions concerning the imposition of general limitations upon the authority of the officers of this Corporation.

This instrument may be signed in one or more counterparts all of which taken together shall constitute one and the same instrument.

IN WITNESS WHEREOF, we have duly signed this instrument effective as of the 11th day of August , 1988.

Harvey S. Sadow

Hans Peter Gieseler

Digby W. Barrios

18. initiating lawsuits or arbitration proceedings of any kind except for the collection of outstanding debts and those not having significant importance;

19. appointing or dismissing, as shareholder, the directors of the Boards of any subsidiary or affiliated corporation;

20. appointing new outside auditors, changing outside auditors or not appointing outside auditors;

21. purchasing insurance coverage for General Liability or Product Liability at premiums that are higher or at limits that are lower than those specifically set forth in an approved budget; and

22. other transactions, if any, for which board of directors approval is legally required.

RESOLVED that, these resolutions shall supercede any and all previously adopted resolutions concerning the imposition or general limitations upon the authority of the officers of this Corporation.

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21. purchasing insurance coverage for General Liability or Product Liability at premiums that are higher or at limits that are lower than those specifically set forth in an approved budget; and

22. other transactions, if any, for which board of directors approval is legally required.

RESOLVED that, these resolutions shall supersede any and all previously adopted resolutions concerning the imposition of general limitations upon the authority of the officers of this Corporation.

This instrument may be signed in one or more counterparts all of which taken together shall constitute one and the same instrument.

IN WITNESS WHEREOF, we have duly signed this instrument effective as of the 11th day of August , 1988.

Harvey S. Sadow

Hans Peter Gieseler

Digby W. Barrios

UNITED STATES

NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF	)	DOCKET NO. 030-17101
BOEHRINGER INGELHEIM	)	LICENSE NO. 06-19183-01
PHARMACEUTICALS, INC.	)	APRIL 6, 1994

RESPONSE TO DEMAND FOR INFORMATION

On March 15, 1994, Boehringer Ingelheim Pharmaceuticals, Inc. ("BIPI") received a Demand for Information ("DFI"), from the Nuclear Regulatory Commission ("NRC"), concerning BIPI's Decommission Funding Plan ("DFP") and evidence of financial assurance therefor, which are being submitted to the NRC in connection with BIPI's response to the NRC's DFI.

The following data and information constitute BIPI's response to the NRC's DFI:

1. The DFP which includes a Letter of Credit and Standby Trust Agreement are herewith enclosed.

2. A detailed cost estimate is included as Table 6-1 of

the DFP.

3. A contingency factor of 25% has been incorporated into the total decommissioning cost estimate as indicated in the Decommissioning Cost Estimate in the DFP and no credit was taken for salvage value.

4. In determining an appropriate estimate for decommissioning costs, an estimate of five (5) percent per year for inflation was assumed in addition to changes in prices of goods and services, facility conditions, and future decommissioning procedure(s). Therefore, we determined that the costs for decommissioning would not be more than $160,000 at the end of the five (5) year term of the letter of credit, at which time we would re-evaluate the instrument. Accordingly, BIPI has determined that $200,000 will be more than sufficient to allow any adjustment of cost estimates and associated funding levels over the life of the facility.

5. To the best of my knowledge, the preceding statements and enclosed data and information represent a complete and accurate response to the NRC's DFI, dated March 11, 1994. I hereby certify that the content of this

Response to the DFI is true and correct to the best of my knowledge and belief.

James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT 06877

CONVERSATION RECORD

TIME 9:30 Am | DATE 3/21/94

TYPE: ☐ VISIT ☐ CONFERENCE ☑ TELEPHONE ☐ INCOMING ☑ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Vincent D. Chase, ESQ	Boehringer Ingelheim	203-791-6270

SUBJECT: Financial Assurance/DFP

ROUTING	
NAME/SYMBOL	INT

SUMMARY:

He said they Accelerating the A.D. Little DFP/FA package.

Boehringer Ingelheim Inc. is their parent. I informed him that I will need evidence of the Parent/Subsidiary relationship, (in the form of encorporation agreements, etc.).

I asked him when they will be submitting this; He told me that according to the Demand for Information they have until April 11, 1994, and will try to have it in the next two weeks.

I told him to adhere to the recommended wording as closely as possible, to send originally signed documents, and ~~seal~~ seals

ACTION REQUIRED

FA/DFP

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
DIMITRIADIS	A. Dimitriadis	3/21/94

ACTION TAKEN

SIGNATURE	TITLE	DATE

ML 10

MAR 1 1 1994

License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

Dear Dr. Keirns:

SUBJECT: FINANCIAL ASSURANCE, DEMAND FOR INFORMATION

Our records show that as of July 27, 1990, you were required to comply with 10 CFR 30.35. 10 CFR 30.35 requires that licensees, authorized to possess amounts of licensed material listed in the above referenced license, submit a decommissioning funding plan or a certificate of financial assurance for decommissioning. The NRC received your initial response to this requirement. However, you have failed to respond to the deficiency letter dated November 23, 1993 within the required time period. You, therefore, appear to be in violation of this requirement.

The Commission considers noncompliance with 10 CFR 30.35 to be a significant regulatory concern because of the importance of assuring that licensees, and not the public, pay for decommissioning of licensed facilities. To determine whether your license should be modified, suspended or revoked, or whether other enforcement action is appropriate, you are required to respond in writing, and under oath or affirmation, and within 30 days of the date of this letter with the information described in the enclosed Demand for Information.

Your response should be addressed to Region I at the above address and should be clearly marked, "Response to Demand for Information."

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

OFFICIAL RECORD COPY

RETURN ORIGINAL TO REGION I

IE:07

P 495 446 282

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
900 Ridgebury Road
P.O. Box 368
Ridgefield, Connecticut 06877

Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date	

PS Form 3800, June 1985

STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE, CERTIFIED MAIL FEE, AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (See front)

1. If you want this receipt postmarked, stick the gummed stub to the right of the return address leaving the receipt attached and present the article at a post office service window or hand it to your rural carrier. (no extra charge)

2. If you do not want this receipt postmarked, stick the gummed stub to the right of the return address of the article, date, detach and retain the receipt, and mail the article.

3. If you want a return receipt, write the certified mail number and your name and address on a "return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.

4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse **RESTRICTED DELIVERY** on the front of the article.

5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in item 1 of Form 3811.

6. Save this receipt and present it if you make inquiry.

☆ U.S.G.P.O. 1989-234-555

The responses directed by this letter and the enclosed Demand for Information are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

If you have any questions concerning this Demand, please contact Anthony Dimitriadis of my staff at (610) 337-6953.

Sincerely,

Original Signed by
Ronald R. Bellamy

Ronald R. Bellamy, Chief
Nuclear Materials Safety Branch
Division of Radiation Safety
and Safeguards

Enclosure:
Demand for Information

cc: w/Enclosure
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of Connecticut

bcc:
Region I Docket Room (w/concurrences)
A. Dimitriadis, RI
M. Shanbaky, RI
R. Bellamy, RI
W. Hehl, RI
D. Holody, RI

DRSS:RI	DRSS:RI	DRSS:RI	DRSS:RI
Dimitriadis	Shanbaky	Bellamy	Hehl
02/7/94	02/28/94	03/8/94	03/8/94

UNITED STATES
NUCLEAR REGULATORY COMMISSION

In the matter of	)	Docket No. 030-17101
Boehringer Ingelheim	)	License No. 06-19183-01
Pharmaceuticals, Inc.		

DEMAND FOR INFORMATION

I

Boehringer Ingelheim Pharmaceuticals, Inc., (The Licensee) holds NRC License No. 06-19183-01 (the License), issued by the Nuclear Regulatory Commission (the NRC or Commission) pursuant to 10 CFR 30, 40 or 70. The license authorizes the licensee to use and possess byproduct material in accordance with the terms and conditions specified therein and the applicable NRC regulations.

II

As of July 27, 1990, the Licensee was required to comply with 10 CFR 30.35 of the Commission's regulations, which requires licensees authorized to possess certain quantities of licensed material to submit either a decommissioning funding plan or a certification of financial assurance for decommissioning in the amount prescribed in 10 CFR 30.35, in accordance with the criteria set forth in that section. The License authorizes such quantities and the NRC staff has not yet received the Licensee's complete response to this requirement. Therefore, the Licensee appears to be in violation of this requirement.

The violation of the requirements of 10 CFR 30.35 is a significant regulatory concern to the NRC staff. Therefore, further information is needed to determine whether the Commission can have reasonable assurance that the Licensee will satisfy the requirements of 10 CFR 30.35 and otherwise conduct its activities in accordance with the Commission's requirements.

III

Accordingly, pursuant to sections 161c, 161o, 182, and 186 of the Atomic Energy Act of 1954, as amended, and 10 CFR 30.32(b), in order for the Commission to determine whether the license should be modified, suspended, or revoked or other enforcement action taken to ensure compliance with NRC regulatory requirements, the Licensee is required to submit to the Administrator, Region I, 475 Allendale Road, King of Prussia, Pennsylvania 19406, within 30 days of the date of this Demand for Information, the information requested in the letter dated November 23, 1993 (copy attached), in writing and under oath or affirmation.

After reviewing your response, the NRC will determine whether further action is necessary to ensure compliance with regulatory requirements.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed By:
Mohamed M. Shanbaky

NUCLEAR MATERIALS SAFETY BRANCH
REGION I
KING OF PRUSSIA, PENNSYLVANIA 19406

Dated at King of Prussia, Pennsylvania
this 11th day of March, 1994

NOV23 1993

License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
900 Ridgebury Road
P. O. Box 368
Ridgefield, Connecticut 06877

Dear Dr. Keirns:

Subject: Financial Assurance for Decommissioning

This is in reference to your letter dated September 29, 1993 and the telephone conversation on November 3, 1993 between Mr. Vince Chase, myself and Anthony Dimitriadis of this office, regarding your need for an additional 60 days in order to "contact the appropriate persons" in order to reply to our letter dated September 1, 1993.

Based on your previous submittals, it appears that you are attempting to comply with the regulation by utilizing a Parent Company Guarantee. We have outlined a list of deficiencies regarding your Parent Company Guarantee in our letter dated September 1, 1993. However, we recognize that the time required to prepare a response to our letter may require longer than 30 days. Therefore, your request for a sixty (60) day extension is hereby granted. We expect a response on or before November 29, 1993.

Regarding your response to Item 1 of our letter indicating that a DFP is not required. 10 CFR 30.35 has been in effect since July 27, 1988, thirty (30) days after the regulation was promulgated. Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (b) of 10 CFR 30.35 was required to submit, on or before July 27, 1990, a certification of financial assurance for decommissioning or a decommissioning funding plan. The regulation in 10 CFR 30.35(c)(2) references 10 CFR 30.35(a) which states:

> "Each applicant for a specific license authorizing the possession and use of unsealed byproduct material of half-life greater than 120 days..."

In addition, Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72", page 1-3, states:

> "The financial assurance requirements outlined in the final decommissioning rule vary depending on several factors, including:
>
> - The amount of material a licensee is authorized to possess and use;..."

This means that the possession limits listed on your license determine the category of certification required, not the quantities possessed or used on a daily basis. The regulation listed in 10 CFR 30.35 (c)(2) is clear, in that a decommissioning funding plan must be submitted with any application for license renewal, if such license authorizes possession and use of unsealed byproduct material of half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities set forth in Appendix C of 10 CFR Part 20. We have reviewed your "decommissioning guidelines" attached to your submittal dated August 13, 1992, and request that you provide additional information to address the specific issues listed below:

1. **Submit a Decommissioning Funding Plan or request to amend your license to lower your possession limits.**

   As described above, the possession limits authorized on your license exceed 10^5 times the applicable quantities listed in Appendix C, thus requiring you to submit a decommissioning funding plan (DFP) at this time, including an actual cost estimate for decommissioning your facility(ies) in accordance with 10 CFR 30.35(c)(2) and (e). The cost estimate must include information necessary to complete Appendix F of Regulatory Guide 3.66. You also have the option of amending your license to lower your possession limits such that submission of a DFP is not required. One of the following options would accomplish that objective:

   a. Amend items 6.A., 7.A. and 8.A. as follows:

Any byproduct material with Atomic Nos. 3 through 83 with a half-life of 120 days or less	Any	Not to exceed 20 millicuries of each radionuclide and 500 millicuries total

   Radionuclides with a half-life greater than 120 days would be listed as line items, similar to current items 6.B., 6.C., 6.D. so long as the total does not require a DFP.

b. Amend items 6.A., 7.A. and 8.A. as a Type B Broad license:

As specified in 10 CFR 33.100, Schedule A	Any	See Condition 12

Condition 12.A. If only one radionuclide is possessed, the possession limit is the quantity specified for that radionuclide in 10 CFR 33.100, Schedule A, Column I. If two or more radionuclides are possessed, the possession limit is determined as follows: For each radionuclide determine the ratio of the quantity possessed to the applicable quantity specified in 10 CFR 33.100, Schedule A, Column I for that radionuclide. The sum of the ratios for all radionuclides possessed under the license shall not exceed unity.

Notwithstanding Subitem A of this condition and 10 CFR 33.100, Schedule A, Column I, the applicable quantities in Condition 12.A. for the following radionuclides are changed to:

Carbon 14	10 curies
Krypton 85	10 curies
Iodine 129	10 millicuries

Any byproduct material other than alpha emitting byproduct material not listed in 10 CFR 33.100, Schedule A:

10 millicuries

This condition would not require you to submit a DFP, and the amount of funds required under the decommissioning rule would be reduced to $750,000, provided other items on your license do not exceed the unity rule.

Please submit a DFP or a request to amend your license. If you submit a DFP, you must submit a Parent Company Guarantee in an amount which coincides with the cost estimate.

2. **Provide a detailed cost estimate and description of all facilities using licensed material.**

Although your current submittal outlines some general procedures for decommissioning your facility, you provide no estimate to decommission laboratories, facility components or decontamination of equipment. Please provide a description of your facilities outlining areas where licensed material has been or is being used, storage of waste, fume hoods, glove boxes and/or exhaust system duct work. In

addition, please provide an estimate for items including but not limited to: manpower requirements, material and equipment needs, waste management/disposal requirements and decontamination alternatives. The enclosed NUREG/CR-1754, Addendum 1 may be helpful in preparing your cost estimate.

3. **Incorporate a contingency factor into the total decommissioning cost estimate and confirm that no credit is taken for salvage value.**

Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR 30, 40, 70 and 72" June 1990, recommends that a contingency factor be included in the decommissioning cost estimate.

Incorporating a contingency factor in the cost estimate will help to ensure that licensees are prepared for unexpected circumstances that could raise decommissioning costs. NUREG/CR-1754, (copy enclosed) uses a contingency factor of 25 percent in its estimates for each of six reference laboratories. Please incorporate a contingency factor of 25 percent into your decommissioning cost estimate. You may choose to use a lower contingency factor if you can show why a lower factor is appropriate.

In addition, confirming that you have not included in the cost estimate credit for any salvage value that may be realized with the sale of potential assets after decommissioning.

4. **Describe the means to be used for adjusting cost estimates and associated funding levels over the life of the facility.**

10 CFR 30.35(e) requires that licensees describe the means they will use to adjust decommissioning cost estimates and associated funding levels over the life of the facility. Please provide such a description in your decommissioning funding plan.

Regulatory Guide 3.66 provides a method for adjusting the cost estimates and suggests that adjustments be made for inflation for site specific factors at the time of license renewal, or when the amounts/types of material at the facility change.

Adjustments should be made to account for inflation, for changes in prices of goods and services, for changes in facility conditions, and for changes in expected decommissioning procedures.

Satisfactory financial assurance is required for your license in accordance with 10 CFR 30.35(f). Furthermore, you must demonstrate that adequate financial responsibility is in place and the funds necessary for a safe decommissioning are being considered, planned for, and are in place early in facility life, thus providing adequate assurance that the facility would not become a risk to public health and safety. You must submit your DFP, or propose a schedule for providing one, by November 29, 1993.

Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 112947. If you have questions regarding this letter, contact Anthony Dimitriadis of my staff at (215) 337-6953.

Sincerely,

Original Signed By:
Mohamed M. Shanbaky

Mohamed M. Shanbaky, Chief
Research and Development Section
Division of Radiation Safety
and Safeguards

Enclosures:
1. 10 CFR 30
2. NUREG/CR-1754

Boehringer Ingelheim

February 25, 1994

K-B

Mohamed M. Shanbaky, Chief
Research, Development and Decommissioning Section
Division of Radiation Safety and Safeguards
United States Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Boehringer Ingelheim Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd.
P.O. Box 368
Ridgefield, Connecticut 06877

Ref: License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Dear Chief,

This is to inform you that Boehringer Ingelheim Pharmaceuticals, Inc. (BIPI) has contracted with Arthur D. Little, Inc. of Cambridge, MA (ADL) to write BIPI's Decommissioning Funding Plan.

In communications with ADL, it is anticipated that barring any unforeseen circumstances, the DFP should be ready for submittal to your office by April 1, 1994.

If you have any questions concerning this matter, please contact me at 203-791-6270.

Sincerely Yours,

Vincent D. Chase

Vincent D. Chase, CHP
Radiation Safety Officer

OFFICIAL RECORD COPY ML 10

Telephone: (203) 798-9988

MAR - 1 1994

030-17101

Boehringer Ingelheim

December 29,1993

Boehringer Ingelheim
Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd.
P.O. Box 368
Ridgefield, Connecticut 06877

Dr. Mohamed M. Shanbaky, Chief
Research and Development Section
USNRC, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Ref: Mail Control No. 112947
License No. 06-19183-01
Docket No. 030-17101

Dear Dr. Shanbaky,

This letter is in reference to your letter of November 23, 1993 and Boehringer Ingelheim Pharmaceuticals, Inc. (BIPI) fax of November 30, 1993.

BIPI has accepted a bid from Arthur D. Little, Inc. of Cambridge, MA (ADL) to formulate BIPI's Decommissioning Funding Plan (DFP). BIPI's legal department is currently in the process of drawing up a contract with ADL detailing the specifications of the DFP and contract closure.

BIPI's Radiation Safety Department (RSD) is currently in communication with ADL. To expedite the submittal of the DFP to your office upon execution of the contract, the RSD is gathering the information required for ADL to complete the DFP during the time that the contract is being drawn up.

If you have any questions regarding this matter, please feel free to contact me.

Sincerely Yours,

Vincent D. Chase
Radiation Safety Officer
Certified Health Physicist

cc: A. Carnam
J. Keirns, Ph.D., Chairman
A. Spak, Ph.D.
A. Slesinger

printed on recycled paper

Telephone: (203) 798-9988

112947

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DOCKET NO. 030-17101

JAN 03 1994

NOV 23 1993

License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee
900 Ridgebury Road
P. O. Box 368
Ridgefield, Connecticut 06877

Dear Dr. Keirns:

Subject: Financial Assurance for Decommissioning

This is in reference to your letter dated September 29, 1993 and the telephone conversation on November 3, 1993 between Mr. Vince Chase, myself and Anthony Dimitriadis of this office, regarding your need for an additional 60 days in order to "contact the appropriate persons" in order to reply to our letter dated September 1, 1993.

Based on your previous submittals, it appears that you are attempting to comply with the regulation by utilizing a Parent Company Guarantee. We have outlined a list of deficiencies regarding your Parent Company Guarantee in our letter dated September 1, 1993. However, we recognize that the time required to prepare a response to our letter may require longer than 30 days. Therefore, your request for a sixty (60) day extension is hereby granted. We expect a response on or before November 29, 1993.

Regarding your response to Item 1 of our letter indicating that a DFP is not required. 10 CFR 30.35 has been in effect since July 27, 1988, thirty (30) days after the regulation was promulgated. Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (b) of 10 CFR 30.35 was required to submit, on or before July 27. 1990, a certification of financial assurance for decommissioning or a decommissioning funding plan. The regulation in 10 CFR 30.35(c)(2) references 10 CFR 30.35(a) which states:

> "Each applicant for a specific license authorizing the possession and use of unsealed byproduct material of half-life greater than 120 days..."

In addition, Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72", page 1-3, states:

> "The financial assurance requirements outlined in the final decommissioning rule vary depending on several factors, including:
>
> - The amount of material a licensee is authorized to possess and use;..."

This means that the possession limits listed on your license determine the category of certification required, not the quantities possessed or used on a daily basis. The regulation listed in 10 CFR 30.35 (c)(2) is clear, in that a decommissioning funding plan must be submitted with any application for license renewal, if such license authorizes possession and use of unsealed byproduct material of half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities set forth in Appendix C of 10 CFR Part 20. We have reviewed your "decommissioning guidelines" attached to your submittal dated August 13, 1992, and request that you provide additional information to address the specific issues listed below:

1. **Submit a Decommissioning Funding Plan or request to amend your license to lower your possession limits.**

   As described above, the possession limits authorized on your license exceed 10^5 times the applicable quantities listed in Appendix C, thus requiring you to submit a decommissioning funding plan (DFP) at this time, including an actual cost estimate for decommissioning your facility(ies) in accordance with 10 CFR 30.35(c)(2) and (e). The cost estimate must include information necessary to complete Appendix F of Regulatory Guide 3.66. You also have the option of amending your license to lower your possession limits such that submission of a DFP is not required. One of the following options would accomplish that objective:

   a. Amend items 6.A., 7.A. and 8.A. as follows:

Any byproduct material with Atomic Nos. 3 through 83 with a half-life of 120 days or less	Any	Not to exceed 20 millicuries of each radionuclide and 500 millicuries total

   Radionuclides with a half-life greater than 120 days would be listed as line items, similar to current items 6.B., 6.C., 6.D. so long as the total does not require a DFP.

b. Amend items 6.A., 7.A. and 8.A. as a Type B Broad license:

As specified in 10 CFR 33.100, Schedule A	Any	See Condition 12

Condition 12.A. If only one radionuclide is possessed, the possession limit is the quantity specified for that radionuclide in 10 CFR 33.100, Schedule A, Column I. If two or more radionuclides are possessed, the possession limit is determined as follows: For each radionuclide determine the ratio of the quantity possessed to the applicable quantity specified in 10 CFR 33.100, Schedule A, Column I for that radionuclide. The sum of the ratios for all radionuclides possessed under the license shall not exceed unity.

Notwithstanding Subitem A of this condition and 10 CFR 33.100, Schedule A, Column I, the applicable quantities in Condition 12.A. for the following radionuclides are changed to:

Carbon 14	10 curies
Krypton 85	10 curies
Iodine 129	10 millicuries

Any byproduct material other than alpha emitting byproduct material not listed in 10 CFR 33.100, Schedule A:

10 millicuries

This condition would not require you to submit a DFP, and the amount of funds required under the decommissioning rule would be reduced to $750,000, provided other items on your license do not exceed the unity rule.

Please submit a DFP or a request to amend your license. If you submit a DFP, you must submit a Parent Company Guarantee in an amount which coincides with the cost estimate.

2. **Provide a detailed cost estimate and description of all facilities using licensed material.**

Although your current submittal outlines some general procedures for decommissioning your facility, you provide no estimate to decommission laboratories, facility components or decontamination of equipment. Please provide a description of your facilities outlining areas where licensed material has been or is being used, storage of waste, fume hoods, glove boxes and/or exhaust system duct work. In

addition, please provide an estimate for items including but not limited to: manpower requirements, material and equipment needs, waste management/disposal requirements and decontamination alternatives. The enclosed NUREG/CR-1754, Addendum 1 may be helpful in preparing your cost estimate.

3. **Incorporate a contingency factor into the total decommissioning cost estimate and confirm that no credit is taken for salvage value.**

Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR 30, 40, 70 and 72" June 1990, recommends that a contingency factor be included in the decommissioning cost estimate.

Incorporating a contingency factor in the cost estimate will help to ensure that licensees are prepared for unexpected circumstances that could raise decommissioning costs. NUREG/CR-1754, (copy enclosed) uses a contingency factor of 25 percent in its estimates for each of six reference laboratories. Please incorporate a contingency factor of 25 percent into your decommissioning cost estimate. You may choose to use a lower contingency factor if you can show why a lower factor is appropriate.

In addition, confirming that you have not included in the cost estimate credit for any salvage value that may be realized with the sale of potential assets after decommissioning.

4. **Describe the means to be used for adjusting cost estimates and associated funding levels over the life of the facility.**

10 CFR 30.35(e) requires that licensees describe the means they will use to adjust decommissioning cost estimates and associated funding levels over the life of the facility. Please provide such a description in your decommissioning funding plan.

Regulatory Guide 3.66 provides a method for adjusting the cost estimates and suggests that adjustments be made for inflation for site specific factors at the time of license renewal, or when the amounts/types of material at the facility change.

Adjustments should be made to account for inflation, for changes in prices of goods and services, for changes in facility conditions, and for changes in expected decommissioning procedures.

Satisfactory financial assurance is required for your license in accordance with 10 CFR 30.35(f). Furthermore, you must demonstrate that adequate financial responsibility is in place and the funds necessary for a safe decommissioning are being considered, planned for, and are in place early in facility life, thus providing adequate assurance that the facility would not become a risk to public health and safety. You must submit your DFP, or propose a schedule for providing one, by November 29, 1993.

Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 112947. If you have questions regarding this letter, contact Anthony Dimitriadis of my staff at (215) 337-6953.

Sincerely,

Original Signed By:
Mohamed M. Shanbaky

Mohamed M. Shanbaky, Chief
Research and Development Section
Division of Radiation Safety
and Safeguards

Enclosures:
1. 10 CFR 30
2. NUREG/CR-1754

bcc:
M. Shanbaky, RI
A. Dimitriadis, RI

DRSS:RI	DRSS:RI
Dimitriadis/cmm	Shanbaky
11/17/93	11/23/93

Boehringer Ingelheim

MS 16
K-8

September 29, 1993

John D. Kinneman, Chief
Research, Development and Decommissioning Section
Division of Radiation Safety and Safeguards
United States Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Boehringer Ingelheim Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd
P.O. Box 368
Ridgefield, Connecticut 06877

Ref: License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Dear Chief,

Boehringer Ingelheim Corporation is a multinational corporation whose officers, financial, and legal personnel travel extensively. To contact the appropriate persons and to assure that they will have time to provide the correct information will require a period of sixty (60) days from the date of this letter.

Reply to Item 1:

Your statements reference 10 CFR 30.35(c)(2) in support of your contention that a decommissioning funding plan (DFP) is required by Boehringer Ingelheim Pharmaceuticals, Inc (BIPI). However, you failed to reference 10 CFR 30.35 *in toto* with regards to the so-called "Unity Rule". Given the clear and concise description in both 10 CFR 35 and Regulatory Guide 3.66, BIPI has calculated that it meets the Unity Rule for the radionuclides which have been involved in the daily operations of its Research and Development (R&D) facility. Therefore, BIPI is certain that a DFP is not required. BIPI will be providing detailed calculations, use history and proposed uses in support of the Unity Rule within the above specified time period.

Reply to Item 2 through Item 5, inclusive:

These matters have been forwarded to the appropriate BIPI departments. An answer will be received by you within the above specified time period.

Enclosed please find a duplicate copy of this response. If you have any questions regarding this response, please feel free to call me at (203) 791-6270.

Sincerely Yours,

Vincent D. Chase
Radiation Safety Officer

112947

OFFICIAL RECORD COPY MD 10

SEP 29 1993

Telephone: (203) 798-9988

SEP 01 1993

License No. 06-19183-01
Docket No. 030-17101
Control No. 112947

Boehringer Ingelheim Pharmaceuticals, Inc.
ATTN: James J. Keirns, Ph.D.
Chairman
Radiation Safety Committee
P. O. Box 368
90 East Ridge
Ridgefield, Connecticut 06877

Dear Dr. Keirns:

Subject: Financial Assurance for Decommissioning

This is in reference to your letter dated August 13, 1992 with attachments dated July 24, 1990 to provide financial assurance for License No. 06-19183-01. We have reviewed your submission and request that you modify it to address the specific matters listed below:

1. Your submission did not include either a decommissioning cost estimate or a certification statement. Based upon the $750,000.00 of assurance specified in the Chief Financial Officer's letter, it appears that a certification statement should have been included. However, 10 CFR 30.35(c)(2) requires that you submit a decommissioning funding plan (DFP), including an actual estimate of the cost to decommission your facilities, in any application for license renewal. Since your application for renewal is under consideration, please submit a DFP or propose a schedule for providing one. The DFP must include appropriate financial assurance for the estimated amount. The cost estimate should include all information necessary to complete Appendix F of Regulatory Guide 3.66 (copy enclosed).

2. Your submission includes a Parent Company Guarantee Agreement which was not signed. Without an authorized signature, the guarantee is not valid. Please submit an originally signed copy of the Agreement, along with evidence that the person signing the Agreement is authorized to represent the guarantor. The corporate resolution that was included in your submission authorizes "the appropriate officers" to enter into and sign a parent company guarantee agreement on behalf of the guarantor, but does not specify who the appropriate officers are.

3. Your submission includes a letter from the Chief Executive Officer of Boehringer Ingelheim Corporation, the guarantor, rather than the Chief Executive Officer of Boehringer Ingelheim Pharmaceuticals, Inc., the licensee. Please submit a letter from the Chief Executive Officer of the licensee. This letter must certify that the licensee is a going concern, identify the amount of its tangible net worth, specify whether the firm is required to file a Form 10K with the U.S. Securities and Exchange Commission, and list the date on which the firm's fiscal year ends.

4. If the licensee defaults on its decommissioning obligations, the guarantor, under Recital 7 of the Parent Company Guarantee Agreement must either (1) carry out required decommissioning activities or (2) make funds available in a trust fund to allow the NRC to pay for these activities. If the guarantor chooses the second option, it must establish a trust fund because funds paid directly to NRC must be deposited in the U.S. Treasury and are not available for decommissioning costs. To ensure that a trust fund will be readily available, if and when needed, Regulatory Guide 3.66 states that a Standby Trust Agreement should be used with a parent company guarantee.

   Please submit a Standby Trust Agreement, acknowledgement and other related documents as recommended in Regulatory Guide 3.66, pages 4-18 through 4-27.

5. Please submit an updated consolidated financial statement of Boehringer Ingelheim Corporation and Subsidiaries and an independent auditor's special report. The financial statement in your submission is for the year ended December 31, 1989.

Satisfactory financial assurance is required for your license. Therefore, we request that you respond within 30 calendar days of the date of this letter. Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 112947. If you have questions regarding this letter, please contact Anthony Dimitriadis of my staff at (215) 337-6953.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Research, Development and
Decommissioning Section
Division of Radiation Safety
and Safeguards

Enclosure:
Regulatory Guide 3.66

bcc:
Kinneman, RI

DRSS:RI
Dimitriadis/srb
08/26/93

DRSS:RI
Kinneman
08/26/93

H-3 = 58 Ci – 58% of $750K

Ca-45 = 10 mCi – 100% or 10% of $

C-14 = 4 Ci – 40% of $750K

Cl-36 = 1 mCi – 1% of $750K.

Call and ask @ change in limits.

Review license first!

Boehringer Ingelheim

M516
L3

September 17,1992

Boehringer Ingelheim
Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd
P.O. Box 368
Ridgefield, Connecticut 06877

Mr. Eric Reber
Nuclear Materials Safety Section A
Division of Radiation and Safeguards
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

License No.: 06-19183-01 92 SEP 18 P1:23

Dear Mr. Reber:

This is in response to our telephone conversation of August 18, 1992, requesting a decommissioning funding plan or a reduction of license limits (unity rule) relating to our license renewal. We have chosen the latter. We hereby request the following change to our current license limits and the limits specified in our license renewal application as well:

H-3	58,000 mCi	C-14	4,000 mCi
Ca-45	10 mCi	P-32	100 mCi
P-33	100 mCi	S-35	100 mCi
I-125	50 mCi	Cr-51	50 mCi
Na-22	1 mCi	Cl-36	1 mCi
Zn-65	1 mCi	Se-75	1 mCi
Rb-87	1 mCi	Tl-204	1 mCi

Any byproduct material with Atomic Numbers 1 through 83 & Half-life of <120 days — Not to exceed 50 mCi per radionuclide & 1 Ci total

Sealed sources:

Ni-63	Not to exceed 15 mCi per source and 100 mCi total
I-129	0.5 mCi

Irradiator:

Cs-137	6000 Ci

If there are any changes due to expansion or waste storage, we will notify you prior to any implementation.

Thank you for your attention to this matter. If I may be of further assistance in this matter, please call me.

Sincerely,

Kathleen Dolce

Kathleen Dolce
Radiation Safety Officer

cc: Mr. Art Slesinger, Director of Safety & Env. Affairs
Dr. James Keirns, Chairman, Radiation Safety Committee
File

1/2947
SEP 18 1992

Telephone (203) 798-9988

Boehringer Ingelheim

MS16
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Boehringer Ingelheim
Pharmaceuticals, Inc.
a subsidiary of
Boehringer Ingelheim Corporation
900 Ridgebury Rd
P.O. Box 368
Ridgefield, Connecticut 06877

August 13, 1992

Mr. Eric Reber
Research, Development & Decommissioning Section B
Nuclear Materials Safety Section
Division of Radiation Safety and Safeguards
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

Material License No. 06-19183-01 Control #112947

Dear Mr. Reber:

Per your request for inclusion of a decommissioning funding plan in Boehringer Ingelheim's License Renewal Application dated April 22, 1991, the information was sent in July 1990. The memorandum dated July 24, 1990 was sent to Mr. John Kinneman regarding this matter (copy attached). The information contained within this report should suffice.

In addition, please find enclosed our decommissioning plan.

If you have any questions, please contact Ms. Dolce at (203) 791-6270.

Sincerely,

James Keirns, Ph.D.
Chairperson, RSC

cc: Ms. K. Dolce
File

112947

OFFICIAL RECORD COPY ML 10

AUG 17 1992

Telephone (203) 798-9988

BOEHRINGER INGELHEIM PHARMACEUTICALS, INC.
Response to USNRC Request Dated August 12, 1992

Prepared by:
Kathleen Dolce

Boehringer Ingelheim

Radiation Safety Office

Boehringer Ingelheim Pharmaceuticals, Inc.
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877
Telephone: (203) 798-5495

July 24, 1990

J. D. Kinneman, Chief
Nuclear Materials Safety Section A
Division of Radiation Safety and Safeguards
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

Re: Amendment of Materials License #06-19183-01

Dear Mr. Kinneman:

Enclosed are documents certifying to financial assurance for decommissioning in the amount of $750,000, as required by 10 CFR 30.35. We understand that this certification will become part of our materials license by amendment.

Enclosed is our check for $180 to cover the license amendment fee (category 3A).

Yours truly,

Clark W. Perry, Ph.D.
Radiation Safety Officer

and

James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee

NRCAMND6.LTR

Boehringer Ingelheim

Inter-office memorandum

To: Dr. James Keirns **Date:** July 24, 1990

From: Mr. Gilbert E. Schuessler

Subject: Nuclear Regulatory Commission (N.R.C.) Filing

Attached is an original and two copies of the following documents:

1. Letter of Chief Executive Officer
2. Letter of Chief Financial Officer
3. Parent Company Guarantee
4. Report of Independent Accountant's
5. Certified copy of the Resolution of the BIC Board of Directors Re: Guarantee

It is our understanding that you shall file these together with all necessary documents and the required filing fee with the N.R.C. This filing is undertaken in order to meet the N.R.C. financial assurance requirements for Decommissioning under 10CFR.

Should you have any questions or requirements, please call me.

G.E. Schuessler

GES/med
attachments

Boehringer Ingelheim

DIGBY W. BARRIOS
President
Chief Executive Officer

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

United States Nuclear Regulatory Commission
Washington, DC 20555

I am the chief executive officer of Boehringer Ingelheim Corporation, 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877, a corporation. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part 30.

I hereby certify that Boehringer Ingelheim Corporation is currently a going concern, and that it possesses positive tangible net worth in the amount of $286,435,000.

This firm is not required to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year. This fiscal year of this firm ends on December 31.

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

Digby Barrios
President and Chief Executive Officer

June 19, 1990

Telephone: (203) 431-5849
798-4060
Telex: 179153 Answer back BIC UT
FAX: (203) 431-6556

Boehringer Ingelheim

Werner Gerstenberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

United States Nuclear Regulatory Commission
Washington, DC 20555

I am the chief financial officer of Boehringer Ingelheim Corporation, 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877, a corporation. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part 30.

This firm guarantees, through the parent company guarantee submitted to demonstrate compliance under 10 CFR Part 30, the decommissioning of the following facility owned or operated by a subsidiary of this firm. The current cost estimates or certified amounts for decommissioning, so guaranteed, are shown for each facility:

Name of Facility	Location of Facility	Current Cost Estimates
Boehringer Ingelheim Pharmaceuticals, Inc. Research & Development Facility	Ridgefield, CT	$750,000

This firm is not required to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year.

This fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended December 31, 1989.

Telephone: (203) 431-5830
Telex: 179153 Answer back: BIC UT
Telefax: (203) 431-6556

		Thousands of Dollars
1.	Decommissioning cost estimates for facility	$ 750
*2.	Total liabilities	130,057
*3.	Tangible net worth	286,435
*4.	Net worth	290,760
*5.	Current assets	212,023
*6.	Current liabilities	101,350
*7.	Net working capital (line 5 minus line 6)	110,673
*8.	The sum of net income plus depreciation, depletion, and amortization	12,232
*9.	Total assets in United States	420,817

		Yes	No
10.	Is line 3 at least $10 million?	X	
11.	Is line 3 at least 6 times line 1?	X	
12.	Is line 7 at least 6 times line 1?	X	
13.	Are at least 90 percent of firm's assets located in the United States?	X	
14.	Is line 9 at least 6 times line 1?	X	
15.	Is line 2 divided by line 4 less than 2.0?	X	
16.	Is line 8 divided by line 2 greater than 0.1?		X
17.	Is line 5 divided by line 6 greater than 1.5?	X	

---

* Denotes figures derived from financial statements.

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

Werner Gerstenberg
Executive Vice President
and Chief Financial Officer

June 15, 1990

Boehringer Ingelheim

Werner Gerstenberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

PARENT COMPANY GUARANTEE

Guarantee made this 24th day of July 1990 by Boehringer Ingelheim Corporation, a corporation organized under the laws of the State of Nevada, herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), obligee, on behalf of our subsidiary Boehringer Ingelheim Pharmaceuticals, Inc. of 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877.

Recitals

The guarantor has full authority and capacity to enter into this guarantee under its bylaws, articles of incorporation, and the laws of the State of Nevada, its State of incorporation. Guarantor has approval from its Board of Directors to enter into this guarantee.

This guarantee is being issued to comply with regulations issued by the NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the energy Reorganization act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 30 which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part 30 provide assurance that funds will be available when needed for required decommissioning activities.

The guarantee is issued to provide financial assurance for decommissioning activities for Boehringer Ingelheim Pharmaceuticals, Inc.'s Research and Development facility as required by 10 CFR Part 30. The decommissioning costs for which are $750,000.

The guarantor meets or exceeds the following financial test criteria of:

(i) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates (or prescribed amount if certification is used); and

Telephone: (203) 431-5830
Telex: 179153 Answer back BIC UT
T[illegible] (203) 431-6556

(ii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the amount of the current decommissioning cost estimates (or prescribed amount if certification is used); and

(iii) Meets two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities that is greater than 0.1; and a ratio of current assets to current liabilities that is greater than 1.5; and

(iv) Tangible net worth of at least $10 million, and

agrees to comply with all notification requirements as specified in 10 CFR Part 30.

The guarantor has majority control of the voting stock for the licensee covered by this guarantee. Boehringer Ingelheim Pharmaceuticals, Inc., 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877. License No. 06-19183-01.

Decommissioning activities as used below refers to the activities required by 10 CFR Part 30 for decommissioning of the facility identified above.

For value received from the licensee pursuant to the authority conferred upon the guarantor by the unanimous resolution of its Board of Directors, a certified copy of which is attached, the guarantor guarantees to the "NRC" that if the licensee fails to perform the required decommissioning activities, as required by License No. 06-19183-01, the guarantor shall

(a) carry out the required activities, or

(b) set up a trust fund in favor of the above identified beneficiary in the amount of these current cost estimates for these activities.

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.

The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, it fails to meet the financial test criteria, the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to the "NRC" that the licensee intends to provide alternative financial assurance as specified in 10 CFR Part 30. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance if the licensee has not done so.

The guarantor also agrees to notify the beneficiary promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternate financial assurance acceptable to the beneficiary.

The guarantor agrees that within 30 days after it determines that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor for the facility under License No. 06-19183-01, it shall establish an alternative financial assurance as specified in 10 CFR Part 30 applicable, in the name of Boehringer Ingelheim Pharmaceuticals, Inc. unless licensee has done so.

The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or "NRC"-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part 30.

The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor.

The guarantor agrees to remain bound under this guarantee for as long as Boehringer Ingelheim Pharmaceuticals, Inc. must comply with the applicable financial assurance requirements of 10 CFR Part 30, for the previously listed facility except that the guarantor may cancel this guarantee by sending notice by certified mail to the "NRC" and to Boehringer Ingelheim Pharmaceuticals, Inc., such cancellation to become effective no earlier than 120 days after receipt of such notice by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. as evidenced by the return receipts.

The guarantor agrees that if Boehringer Ingelheim Pharmaceuticals, Inc. fails to provide alternative financial assurance as specified in 10 CFR Part 30, as applicable, and obtain written approval of such assurance from the "NRC" within 90 days after a notice of cancellation by the guarantor is received by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. from the guarantor, the guarantor shall provide such alternative financial assurance in the name of Boehringer Ingelheim Pharmaceuticals, Inc. or make full payment under the guarantee.

The guarantor expressly waives notice of acceptance of this guarantee by the "NRC" or by Boehringer Ingelheim Pharmaceuticals, Inc. The guarantor also expressly waives notice of amendments or modification of the decommissioning requirements and of amendments or modifications of the license.

If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to the "NRC" during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: July 24, 1990

Boehringer Ingelheim Corporation

Werner Gerstenberg

Executive Vice President
and Chief Financial Officer

Signature or witness of notary:

Deloitte & Touche

1600 Summer Street
Stamford, Connecticut 06905-5121
Telephone: (203) 351-4600
Facsimile: (203) 351-4797

INDEPENDENT ACCOUNTANTS' REPORT

Board of Directors
Boehringer Ingelheim Corporation
Ridgefield, Connecticut

We have audited, in accordance with generally accepted auditing standards, the consolidated financial statements of Boehringer Ingelheim Corporation and Subsidiaries for the year ended December 31, 1989, and have issued our report thereon dated January 26, 1990.

Boehringer Ingelheim Corporation has prepared documents to demonstrate its financial responsibility under the "NRC's" financial assurance regulations, 10 CFR Part 30. This letter is furnished to assist the licensee in complying with these regulations and should not be used for other purposes.

The attached "Reconciliation of Amounts in Chief Financial Officer's Letter with Financial Statements" reconciles the specified information furnished in the chief financial officer's (CFO's) letter in response to the regulations with the Company's audited financial statements for the year ended December 31, 1989. In connection therewith, we have:

1. Confirmed that the amounts in the column "Per Financial Statements" agree with amounts contained in the Company's audited consolidated financial statements for the year ended December 31, 1989;

2. Confirmed that the amounts in the column "Per CFO's Letter" agree with the letter prepared in response to the NRC's request;

3. Confirmed that the amounts in the column "Reconciling Items" agree with analyses prepared by the Company setting forth the indicated items; and

4. Recomputed the totals and percentages in the CFO's letter.

Because the procedures in one through four above do not constitute an audit made in accordance with generally accepted auditing standards, we do not express an opinion on the manner in which the amounts were derived in the items referred to above. In connection with the procedures referred to above, no matters came to our attention that caused us to believe that the chief financial officer's letter and supporting information should be adjusted. Had we performed additional procedures or had we conducted an audit of the schedule in accordance with generally accepted auditing standards, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the Board of Directors of Boehringer Ingelheim Corporation and the NRC and should not be used for any other purpose.

Deloitte & Touche
Signature

June 11, 1990
Date

BOEHRINGER INGELHEIM CORPORATION

Reconciliation of amounts in Chief Financial Officers letter with Financial Statements

Year Ended December 31, 1989

Line Number in CPO's Letter		Per Financial Statements	Reconciling Items	Per CPO Letter
		(In Thousands of dollars)		
6	Total current liabilities	101,350		
	Long Term Debt	4,938		
	Deferred income taxes	23,769		
		130,057		
	Accrued decommissioning costs included in current liabilities		0	
2	Total liabilities (less accrued decommissioning costs)			130,057
	Net worth	290,760		
	Less patents, licenses, trademarks, goodwill & other intangible assets	4,325		
		286,435		
	Accrued decommissioning costs included in current liabilities		0	
3	Tangible net worth (plus decommissioning costs)			286,435
	Net income (loss)	(5,524)		
	Depreciation, depletion & amortization	17,756		
8	Total	12,232	0	12,232
5	Current Assets	212,023	0	212,023
6	Current Liabilities	101,350	0	101,350
7	Net Working Capital	110,673	0	110,673

BIC065X

CERTIFICATION BY SECRETARY

OF

BOEHRINGER INGELHEIM CORPORATION

I hereby certify that the following is a full, true and correct copy of certain resolutions duly and regularly adopted by the Executive Committee of the Board of Directors of BOEHRINGER INGELHEIM CORPORATION as of the 20th day of July, 1990:

WHEREAS, Boehringer Ingelheim Pharmaceuticals, Inc., a wholly-owned subsidiary of this Corporation, uses radioactive material at its research and development facilities for which a license, from the Nuclear Regulatory Commission ("NRC"), is required, and

WHEREAS, each NRC licensee is required to submit to the NRC a decommissioning funding plan, and,

WHEREAS, decommissioning requires the licensee "... to remove...safely from service and residual radioactivity to a level that permits release of the property for unrestricted use and termination of [the] license." 10 CFR 30.4, and

WHEREAS, the financial assurance may be provided by the licensee's parent company through a Parent Company Guarantee, and

WHEREAS, the Parent Company Guarantee is a "net worth" test which permits Boehringer Ingelheim Pharmaceuticals, Inc. to use the financial condition of Boehringer Ingelheim Corporation to meet the financial test criteria of the NRC regulations, and

WHEREAS, the cost of decommissioning is estimated, based on the NRC guidelines, to be $750,000 and the required financial assurance must be six times such estimated cost, or $4,500,000.

NOW, THEREFORE, IT IS

RESOLVED that, the appropriate officers of this corporation be, and they hereby are, authorized to guarantee financial assurance for decommissioning activities, for Boehringer Ingelheim Pharmaceuticals, Inc.'s research and development facility, required by the Nuclear Regulatory Commission, and

RESOLVED that, in accomplishing the aforesaid resolution the appropriate officers of this Corporation be, and they hereby are, authorized to execute a Parent Company Guarantee substantially in the form attached hereto and made a part hereof and to perform such other acts or things as are necessary or appropriate to accomplish the intent hereof.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed the seal of the said Corporation this 24th day of July, 1990.

Philip J. Franks
Secretary

(SEAL)

Boehringer Ingelheim

Werner Gerstenberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

PARENT COMPANY GUARANTEE

Guarantee made this 16th day of July 1990 by Boehringer Ingelheim Corporation, a corporation organized under the laws of the State of Nevada, herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), obligee, on behalf of our subsidiary Boehringer Ingelheim Pharmaceuticals, Inc. of 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877.

Recitals

The guarantor has full authority and capacity to enter into this guarantee under its bylaws, articles of incorporation, and the laws of the State of Nevada, its State of incorporation. Guarantor has approval from its Board of Directors to enter into this guarantee.

This guarantee is being issued to comply with regulations issued by the NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the energy Reorganization act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 30 which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part 30 provide assurance that funds will be available when needed for required decommissioning activities.

The guarantee is issued to provide financial assurance for decommissioning activities for Boehringer Ingelheim Pharmaceuticals, Inc.'s Research and Development facility as required by 10 CFR Part 30. The decommissioning costs for which are $750,000.

The guarantor meets or exceeds the following financial test criteria of:

(i) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates (or prescribed amount if certification is used); and

Telephone: (203) 431-5830

(ii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the amount of the current decommissioning cost estimates (or prescribed amount if certification is used); and

(iii) Meets two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities that is greater than 0.1; and a ratio of current assets to current liabilities that is greater than 1.5; and

(iv) Tangible net worth of at least $10 million, and

agrees to comply with all notification requirements as specified in 10 CFR Part 30.

The guarantor has majority control of the voting stock for the licensee covered by this guarantee. Boehringer Ingelheim Pharmaceuticals, Inc., 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877. License No. 06-19183-01.

Decommissioning activities as used below refers to the activities required by 10 CFR Part 30 for decommissioning of the facility identified above.

For value received from the licensee pursuant to the authority conferred upon the guarantor by the unanimous resolution of its Board of Directors, a certified copy of which is attached, the guarantor guarantees to the "NRC" that if the licensee fails to perform the required decommissioning activities, as required by License No. 06-19183-01, the guarantor shall

(a) carry out the required activities, or

(b) set up a trust fund in favor of the above identified beneficiary in the amount of these current cost estimates for these activities.

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.

The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, it fails to meet the financial test criteria, the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to the "NRC" that the licensee intends to provide alternative financial assurance as specified in 10 CFR Part 30. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance if the licensee has not done so.

The guarantor also agrees to notify the beneficiary promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternate financial assurance acceptable to the beneficiary.

The guarantor agrees that within 30 days after it determines that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor for the facility under License No. 06-19183-01, it shall establish an alternative financial assurance as specified in 10 CFR Part 30 applicable, in the name of Boehringer Ingelheim Pharmaceuticals, Inc. unless licensee has done so.

The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or "NRC"-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part 30.

The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor.

The guarantor agrees to remain bound under this guarantee for as long as Boehringer Ingelheim Pharmaceuticals, Inc. must comply with the applicable financial assurance requirements of 10 CFR Part 30, for the previously listed facility except that the guarantor may cancel this guarantee by sending notice by certified mail to the "NRC" and to Boehringer Ingelheim Pharmaceuticals, Inc., such cancellation to become effective no earlier than 120 days after receipt of such notice by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. as evidenced by the return receipts.

The guarantor agrees that if Boehringer Ingelheim Pharmaceuticals, Inc. fails to provide alternative financial assurance as specified in 10 CFR Part 30, as applicable, and obtain written approval of such assurance from the "NRC" within 90 days after a notice of cancellation by the guarantor is received by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. from the guarantor, the guarantor shall provide such alternative financial assurance in the name of Boehringer Ingelheim Pharmaceuticals, Inc. or make full payment under the guarantee.

The guarantor expressly waives notice of acceptance of this guarantee by the "NRC" or by Boehringer Ingelheim Pharmaceuticals, Inc. The guarantor also expressly waives notice of amendments or modification of the decommissioning requirements and of amendments or modifications of the license.

If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to the "NRC" during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: _____

Boehringer Ingelheim Corporation

_____

Werner Gerstenberg

Executive Vice President
and Chief Financial Officer

Signature or witness of notary: _____

I. Decommissioning Guidelines

A. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for By-product, Source, or Special Nuclear Materials.[1]

These instructions, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. Boehringer Ingelheim Pharmaceuticals, Inc. (BIPI) shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or duct work shall be determined by making measurements at all traps, or other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or duct work. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction,
or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

---

[1]These guidelines were taken from a document of the same title written by the U. S. Nuclear Regulatory Commission Division of Fuel Safety, Washington, D.C., revised May, 1987.

4. Upon request, NRC may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests shall:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, BIPI shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the NRC. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

   Following submittal of the report, the facilities shall be made available for the NRC to perform an inspection and surveys to confirm the surveys performed by BIPI.

B. Decommissioning Plan

The Ridgefield/Danbury, Connecticut facility began operation at its current location in 1979 and occupies approximately 300 acres. The outline shown below is written to give general guidance to the facility RSO in decommissioning this facility so that it can be free-released.

1. Removal of extraneous items and/or minor equipment. Such items as carts, laboratory supplies, tables should all be wiped down completely and the following surveys performed:

   - smear survey to be counted for both beta and gamma contamination

   - a direct frisk for fixed contamination

   - the NRC guidelines for decommissioning of facilities shall be used (See Table 1)

2. Removal of major equipment

   All major equipment such as chemical fume hoods, biological safety cabinets, incubators, and autoclaves and filter systems shall be totally wiped down and cleaned. Following wipe down and cleaning of the exterior, smear and fixed contamination surveys of the exterior and accessible interior parts portions of the machinery shall be performed. This equipment may either remain as contaminated equipment for contaminated use at another Boehringer Ingelheim Corporation (BIC) facility or disassembled. Disassembled items which do not meet free-release criteria will be decontaminated. If they do not meet the requirements of Part A of this section, they will be disposed of as radioactive waste at a licensed burial facility or reused at another BIC facility.

3. Clean Up of Ceiling and Walls

   Ceilings and walls shall be cleaned using a pressurized water spray. This water will be collected in the normal waste water processing trench and pits and will be sampled and analyzed prior to discharge.

Once the walls and ceiling have been cleaned, swipe and fixed representative surveys should be initiated and documented to confirm compliance with Table 1. Following this, any piping which carried radioactive or potentially radioactive water shall be removed, cleaned as much as practicable, cut up and shipped for disposal. If the decontamination effort is successful the piping will be disposed of as non-radioactive waste.

4. Floor Areas

All floor areas shall be cleaned, starting from the restricted clean areas and working towards the contaminated area. Any waste water generated shall be processed through the normal waste water processing procedure.

5. Waste water trench, dumps and holding pit

These areas shall be initially pumped dry following the requirements listed below:

a. Pit to be adequately ventilated for 15 minutes prior to entry.

b. Minimum initial entry protective clothing will be full body protective clothing, boots, and rubber gloves, taped.

c. An initial entry air sample will be taken for 10 minutes and analyzed prior to entry.

d. An initial radiation survey will be performed to assess potential exposure or the need for stay time calculations.

The pit shall be cleaned with a high pressure water lance. Any particulate which settles out in the holding pit will be removed, dried and packaged for disposal in accordance with applicable regulations and burial site criteria. The pit shall then be surveyed and further decontaminated using a pneumatic scaler unit. The areas to be scaled shall be continuously wet down and all chipping should be done from the noncontaminated initial chipped area from behind. Final surveys will be performed using both an alpha scintillation probe and portable GM frisking instrument. Exposure rate measurements (in units of mr/hr) will be derived using a calibrated GM survey meter or ion chamber.

6. Survey of Sewer Lines

The following surveys shall be performed and documented:

a. mr/hr with GM survey meter or ion chamber at exit point from the facility and in accessible man holes.

b. Sludge samples from any identified sedimentation or likely reconcentration point shall be taken and gamma spectral analyses performed. Gamma spectroscopy will be performed by a qualified vendor.

c. Applicable meter surveys shall be performed and documented in these areas.

7. Survey of Roof

A detailed survey of the roof shall be performed and documented. A GM frisker calibrated in counts per minute (cpm) should be used to perform the survey.

8. Environmental Surveys

Soil samples shall be obtained from the surrounding grounds and gamma spectral analyzed. Gamma spectroscopy will be performed by a qualified vendor.

9. Radiological Precautions to be taken throughout the decommissioning.

a. Air samplers located throughout the facility shall be running continuously during all operations and analyzed weekly. They should be analyzed immediately if any suspected airborne contamination has occurred.

b. Entrances and exits to the restricted areas shall be smear surveyed daily. A complete facility smear survey shall be performed weekly.

c. An air sample is to be run continuously during work in the pit.

d. All records shall be kept and maintained and shall include instrument model number, type and serial number, date and initials of person performing the survey.

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION

Nuclides[a]	Average[bcf] dpm/100cm^2	Maximum[bdf] dpm/100cm^2	Removable[bef] dpm/100cm^2
U-nat, U-235, U-230, and Associated decay products	5000	15000	1000
Transuranics, Ra-226, Ra-220, Th-230, Th-228, Pa-231. Ac-227, I-125, I-129	100	300	20
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232,I-126, I-131, I-133	1000	3000	200
Beta-gamma emitters (nuclides with decay modes other than Alpha emissions or spontaneous fission) except Sr-90 and others noted above.	5000	15000	1000

[a] Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 square centimeters.

[e] The amount of removable radioactive material per cm2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

U. S. Nuclear Regulatory Commission Telephone or Verbal Conversation Record		Date: 8/12/92 Time: 2:30 pm.
___ Incoming Call X Outgoing Call ___ Visit		
Person Calling: Eric H. Reber	**Office:** USNRC Region I	**Phone #:**(215) 337-5276
Person Called: James Keirns, Ph. D.	**Office:**RSO	**Phone #:**(203)798-5109

Conversation

Subject: Financial Assurance for Boehringer Ingelheim Pharmaceuticals/ 06-19183-01

Summary: Please provide a decommissioning funding plan, or request a license amendment which will limit the possession of unsealed byproduct material of half-life greater than 120 days in the following or similar manner: If only one such isotope is possessed,the quantity possessed will be maintained at a quantity less than or equal to 10^5 times the applicable quantity in Appendix C of Part 20. For a combination of such isotopes, where R is defined as the sum of ratios of the quantity of each isotope to 10^5 times the applicable quantities in Appendix C, R shall not exceed 1 (unity rule).

He states he would respond within 30 days.

Referred to:

Action Requested:

Action Taken:

 112947

TELEPHONE CONVERSATON RECORD	**Date:** August 18, 1992	**Time:** 1:30pm
Mail Control No.: 112947	**License No.:**06-19183-01	**Docket No.:**030-17101
Person Called: Kathleen Dolce	**Organization:**RSO	**Telephone Number:** (203)791-6270
Person Calling: Eric H. Reber		
Subject: Financial Assurance		
Summary: Kathleen stated that she will be looking into preparing a DFP and will send a status report within 30 days.		
Action Required/Taken:		
Signature: Eric H. Reber	**Date:** 8/18/92	

 112947

TELEPHONE CONVERSATON RECORD	Date: 8/18/92	Time: 11:10
Mail Control No.: 112947	**License No.:**06-19183-01	**Docket No.:**030-17101
Person Called: James Keirns, Ph.D.	**Organization:**RSO	**Telephone Number:** (203)798-5109
Person Calling: Eric H. Reber		
Subject: Boehringer's response dated August 13, 1992/		
Summary: The DFP in your 8/13/92 is not adequate. Please provide additional detail for your decommissioning cost estimate. Please provide all applicable information that is necessary to complete Appendix F to Regulatory Guide 3.66. or amend your license to limit your possession limit to 10^5 x App C to Part 20 (with unity rule.)		
Action Required/Taken:		
Signature: Eric H. Reber	**Date:** 8/18/92	

112947

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 6 1991

MEMORANDUM FOR: John Kinneman, Chief
Nuclear Material Safety
Section Branch
Division of Radiation Safety
and Safeguards, Region I

FROM: Louis Bykoski
Division of Low-Level Waste Management
and Decommissioning, NMSS

SUBJECT: THE OFFICE OF GENERAL COUNSEL (OGC) AND CONTRACTOR COMMENTS ON NONSTANDARD FINANCIAL ASSURANCE SUBMITTALS

Our contractor, ICF Incorporated, and OGC have received and provided comments on thirteen Region I nonstandard financial assurance submittals sent to us for review. The following licensees are included in the mailing.

REGION I

1. U. S. Army Medical Research Institute of Chemical Defense (DFP - statement of intent);
2. Merck Sharp & Dohme Research Laboratories (DFP-parent company guarantee);
3. GTE Products Corporation (DFP-parent company guarantee);
4. Applied Health Physics, Inc. (DFP - line of credit);
5. EG&G, Inc. (DFP - letter of credit);
6. AT&T Network Systems (DFP - letter of credit);
7. Worcester Foundation for Experimental Biology (DFP - trust agreement);
8. Union Carbide Chemicals and Plastics Company (parent company guarantee);
9. Textron Defense Systems (parent company guarantee);
10. New England Deaconess Hospital Corporation (parent company guarantee);
11. General Hospital Corporation (parent company guarantee);
12. The Budd Company (parent company guarantee; and
13. Boehringer Ingelheim Pharmaceuticals, Inc. (parent company guarantee)

The ICF comments are presented in two parts. The first part deals with specific recommendations to correct deficiencies. The second part (Other Issues) provides a discussion of changes to the standard wording that are acceptable and are not considered to be deficiencies. The OGC comments include additional deficiencies that need to be corrected by the licensee and comments for our internal use.

You should carefully review the comments before preparing the deficiency letter. We have enclosed more specific information to help you sort and consolidate the ICF and OGC comments.

Should you have any further questions with regard to the comments, please call me on (301) 492-0572 or Michael Finkelstein of OGC on (301) 492-1623.

Louis Bykoski

Louis Bykoski
Division of Low-Level Waste Management
and Decommissioning, NMSS

Enclosure: As stated.

MS 20
C3
06-19183-01

LIST OF INSTRUCTIONS

Boehringer Ingelheim Pharmaceuticals, Inc.

In reviewing the comments the reviewer will note that there will be some overlap between ICF and OGC comments. The following comments should be included in the basis for the deficiency letter:

1. ICF comments 1 through 4 plus last paragraph.

2. All OGC comments, notice reference to ICF comment #2.

All other comments and discussions are for reviewer information.

112947
08-08-91

July 30, 1991

Memo to: Louis Bykoski, NMSS

From: Michael Finkelstein, OGC

Re: Review of Package #8 (ICF Reviews dated May 31, 1991)

Boehringer Ingelheim Pharmaceuticals-Parent Company Guarantee

All ICF recommendations should be implemented except for recommendation #2. The licensee submitted a signed guarantee agreement from Werner Gerstenberg, Executive Vice President and CFO. Whether or not this corporate official is authorized by the Parent Company to enter into such an agreement is a question that must be addressed by the regional reviewer.

9300 Lee Highway
Fairfax, Virginia
22031-1207

703/934-3000

ICF INCORPORATED

May 31, 1991

To: Dr. Lou Bykoski, NMSS/NRC

From: Bryan Kelleher and John Collier, ICF Incorporated

Subject: Review of Parent Company Guarantee/Financial Test Submitted by Boehringer Ingelheim Pharmaceuticals, Inc.

Boehringer Ingelheim Pharmaceuticals, Inc. in Ridgefield, Connecticut, submitted a certification of financial assurance, using a parent company guarantee with financial test demonstration from Boehringer Ingelheim Corporation in the amount of $750,000. The submission assures decommissioning costs for license number 06-19183-01 issued under 10 CFR Part 30.[1] Upon review of the submission, ICF recommends that NRC Region I require the licensee to modify the submission in the following ways:

(1) Submit either a statement of certification or a decommissioning cost estimate;

(2) Submit a signed guarantee agreement;

(3) Submit a new letter from the licensee's chief executive officer; and

(4) Submit a standby trust fund.

These recommendations and other issues are discussed below.

(1) Submit Either a Statement of Certification or a Decommissioning Cost Estimate

Under 10 CFR 30.35 a licensee is required to submit either a decommissioning cost estimate or a certification statement as a demonstration that adequate funds will be available for decommissioning. The licensee's submission does not include either a decommissioning cost estimate or a certification statement. Based upon the $750,000 of assurance specified in the chief financial officer's letter, it appears that a certification statement should have been included. ICF recommends that NRC require the licensee to submit a certification statement certifying compliance with the decommissioning rules, as recommended in NRC's *Regulatory Guide 3.66* "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72" (June 1990), page 1-5.

---

[1] ICF assumes that NRC has verified that the certification amount is acceptable under 10 CFR 30.35.

(2) Submit a Signed Guarantee Agreement

The submission includes a guarantee agreement that would be acceptable, except that it is not signed. Without an authorized signature, the guarantee is not valid. The licensee should submit a signed copy of the agreement, along with evidence that the person signing the agreement is authorized to represent the guarantor in the agreement. (A corporate resolution that was included in the submission authorizes "the appropriate officers" to enter into and sign a parent guarantee agreement on behalf of the guarantor. However, the resolution does not indicate who the appropriate officers are.)

(3) Submit a New Letter from the Licensee's Chief Executive Officer

Section 4.7.1 of *Regulatory Guide 3.66* requires the licensee to submit a letter from its chief executive officer (CEO). In this letter, the licensee must certify that it is a going concern, identify the amount of its tangible net worth, specify whether the firm is required to file a Form 10K with the U.S. Securities and Exchange Commission, and list the date on which the firm's fiscal year ends.

The submission includes a letter from the CEO of the guarantor, however, rather than the CEO of the licensee. ICF recommends that NRC require the licensee to submit a letter from its CEO providing the above information regarding the licensee.

(4) Submit a Standby Trust Fund

If the licensee defaults on its decommissioning obligations, the guarantor, under Recital 7, must either (1) carry out required decommissioning activities or (2) make funds available in a trust fund to allow NRC to pay for these activities. If the guarantor chooses the second option, it must establish a trust fund because funds paid directly to NRC must be deposited in the U.S. Treasury and are not available for decommissioning costs. To ensure that a trust fund will be readily available if and when needed, *Regulatory Guide 3.66* states that a standby trust fund should be used with a parent company guarantee. ICF recommends that NRC request the licensee to submit a standby trust fund, acknowledgement, and other related documents as recommended in *Regulatory Guide 3.66* on pages 4-18 through 4-27.

Other Issues

Apart from editorial and non-substantive changes to the standard wording provided in *Regulatory Guide 3.66*, the following modifications are noteworthy:

(1) The CFO's letter did not identify the license number or address of the facility listed in paragraph 2, as recommended in *Regulatory Guide 3.66* on page 4-36. Identifying license numbers and facility addresses allows NRC to verify that coverage for all the licenses covered by the test has been included for purposes of the test's financial calculations. However, because the submitted paragraph also identifies the name, location, and current

cost estimate of the facility, there is no benefit to revising the paragraph to identify the license number unless the facility has more than one license. While it appears that no revision is necessary, NRC may wish to verify that neither the licensee nor guarantor have other licenses with financial assurance provided through the guarantor's financial test.

(2) The wording of the independent auditor's special report reconciling the numbers in the CFO's letter with the numbers in the guarantor's financial statements is not identical to the wording recommended on page 4-39 of *Regulatory Guide 3.66*. However, the modified wording does not affect the meaning or validity of the report.

(3) The attached schedule to the auditor's special report indicates that the guarantor had a negative net income of $5,524,000 for the year ended December 31, 1989. Therefore, the guarantor was able to meet only two of the three financial test ratios. This is sufficient to pass the financial test under the regulations.

(4) The submitted corporate resolution indicates that the required amount of financial assurance ($4,500,000) is six times the decommissioning cost estimate ($750,000). The financial test requires only that tangible net worth, net working capital, and total assets in the United States be at least six times the current cost estimate. The amount of financial assurance provided, however, must be equal to or greater than the current cost estimate. Despite the incorrect statement, the guarantor passes the financial test for the required $750,000.

Finally, the Region should ensure that documents submitted by the licensee are originally signed duplicates, as recommended in *Regulatory Guide 3.66*. Unless the documents have been properly signed, NRC cannot be certain that the financial assurance mechanism is enforceable. Because ICF does not possess the original submissions, we cannot verify compliance with these requirements.

attachments

License # 06-19183-0

APPENDIX A
CHECKLIST FOR DECOMMISSIONING FINANCIAL ASSURANCE

NAME OF LICENSEE OR APPLICANT

BOEHRINGER INGELHEIM PHARMACEUTICALS, INC.

MAILING ADDRESS

90 East Ridge, P.O. BOX 368

Ridgefield CT 06877

A. Licensee Part (check one of the following):

X Part 30 Licensee or Applicant ____ Part 70 Licensee or Applicant

____ Part 40 Licensee or Applicant ____ Part 72 Licensee or Applicant

B. Check appropriate item in each category (if applicable)

1. 7/25/90 Date of Financial Assurance Submission

2. ____ Public Entity

____ Private Entity

3. X Certification of Financial Assurance $750,000

____ Decommissioning Funding Plan

4. (a) ____ Prepayment Option (See Appendix B)
   - ____ Trust Fund
   - ____ Escrow Account
   - ____ Certificate of Deposit
   - ____ Government Fund
   - ____ Deposit of Government Securities

   (b) X Surety/Insurance/Other Guarantee (See Appendix C)
   - ____ Surety bond
   - ____ Letter of Credit
   - ____ Line of Credit
   - X Parent Company Guarantee/Financial Test*

   (c) ____ External Sinking Fund, Sinking Account and Surety/Insurance (See Appendix D)
   - ____ Trust Fund
   - ____ Escrow Account
   - ____ Certificate of Deposit
   - ____ Government Fund
   - ____ Deposit of Government Securities
   - ____ Surety Bond
   - ____ Letter of Credit
   - ____ Line of Credit

   (d) ____ Statement of Intent (public entities only)

*May not be used in combination with any other instrument.

Boehringer Ingelheim Pharmaceuticals, Inc
License # 06-19183-0

APPENDIX C

CHECKLIST FOR SUBMISSION OF SURETY/INSURANCE/PARENT COMPANY GUARANTEE

A. Check Appropriate Form of Surety/Insurance/Guarantee

___ Surety Bond

___ Letter of Credit

___ Line of Credit

X Parent Company Guarantee/Financial Test*

___ Insurance

B. Check Documents Submitted for Surety/Insurance/Guarantee

1) CEO's letter - from CEO of Guarantor

2) CEO's letter - no license #

3) Financial Test - passes two of three only.

4) Auditor's Report - missing phrase

5) Attached Schedule - net income was negative last year.

1. Surety Bond
___ Surety Bond
___ Standby Trust Agreement
___ Acknowledgement

2. Letter of Credit
___ Letter of Credit
___ Standby Trust Agreement
___ Acknowledgement

3. Line of Credit
___ Verification
___ Standby Trust Agreement
___ Acknowledgement

4. Parent Company Guarantee
X Letter from Chief Executive Officer of Applicant or Licensee
X Letter from Chief Financial Officer of Parent Company
X Financial Test: Alternative (I) or II]
X Auditor's Special Report and Attached Schedule
X Corporate Guarantee
No Standby Trust Agreement
No Acknowledgement

5. Insurance
___ Certificate of Insurance
___ Standby Trust Agreement
___ Acknowledgement

May not be used in combination with any other instrument.

Boehringer Ingelheim Pharmaceuticals, Inc
License # 06-19183-01

EXHIBIT 3-8

CHECKLIST OF CRITERIA FOR REVIEW OF PARENT COMPANY GUARANTEES

No CEO's letter is from Guarantor

- Copy of letter from the chief executive officer of the licensee, verifying that it is a going concern* with positive tangible net worth (submitted annually at same time as parent company financial test in Sections 4.7.3 and 4.7.4 of this guide).

Yes ✓ Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
Corporate Resolution however, it does not mention names of individuals

- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument). No

Yes ✓ Evidence that the corporate parent has majority control of the applicant's voting stock. Corporate resolution says that licensee is a wholly-owned subsidiary

yes ✓ Name and address of guarantor.

yes ✓ Name and address of the licensee.

yes ✓ Name and address of the regulatory agency.

yes ✓ Recitation of the guarantor's authority to provide the guarantee, such as ownership of the licensee.

yes ✓ Identification of the facilities for which the guarantee provides financial assurance and amounts guaranteed for decommissioning activities.

*A "going concern" is a firm that is expected to continue operating at least long enough for current expectations and plans to be carried out and for the reasonably foreseeable future period after that.

Boehringer Ingelheim Pharmaceuticals, Inc. License # 06-19183-01

EXHIBIT 3-8 (Continued)

- Description of the primary obligation (decommissioning requirements).

- Unequivocal statement of guarantee.

  a. Recitation of the consideration for the guarantee.
  b. Liability of the guarantor.

     a. Limitation of liability
     b. Condition(s) of liability
     c. Effect on liability of a change in the status of the licensee

- Statement that guarantor remains bound despite amendment or modification of license or decommissioning funding plan, reduction or extension of time of performance of required activities, or any other modification or alteration of an obligation of licensee.

- Notice requirements.

- Discharge of the guarantor.

- Termination and revocation.

  1. Termination on occurrence of contingency
  2. Voluntary revocation by guarantor
  3. Effective date of termination or revocation

- Date.

- Signatures.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406

JAN 0 9 1991

MEMORANDUM FOR: Louis M. Bykoski, NRC Project Officer
Low Level Waste Management, Low Level Regulatory Branch

FROM: John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

SUBJECT: NONSTANDARD FINANCIAL ASSURANCE SUBMITTALS RELATED TO THE DECOMMISSIONING RULE

John Austin's August 6, 1990 memorandum set forth a procedure for submitting nonstandard financial assurance submittals to you for review by the NRC contractor. We have also included parent company guarantee's and decommissioning funding plans.

Licensee	License No.	Control No.
Worcester Foundation for Experiment	20-01225-01	112990
Boehringer Ingelheim Pharmaceuticals, Inc.	06-19183-01	112947
Digital Equipment Corp.	20-20815-01	112929
GTE Products Corporation	STB-281	112851
Marine Biological Lab	20-00595-02	113185
Platina Refining Laboratories	29-18345-01	113583
EG&G, Incorporated	20-02804-01	113006
Merck and Company, Inc.	29-00117-06	113032
Interstate Nuclear Services Corporation	20-03529-01	113002
Merck, Sharp & Dohme Research Labs	37-01531-08	113033
General Electric Company	37-02006-09	113257
INS Corporation	37-23341-01	113003
Isomedix, Incorporated	29-19769-02	113157
Isomedix, Incorporated	29-19769-03	113158

OFFICIAL RECORD COPY ML 10

If any of you or the contractors believe any of these cases should more properly be reviewed by the Region, please return them. Some of these cases have obvious, minor deficiencies which we have not attempted to resolve so that we could provide the cases to you promptly.

John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

cc:
J. Glenn, NMSS
R. Bellamy, RI
S. Villar, RI

030-17101

Boehringer Ingelheim

Radiation Safety Office

Boehringer Ingelheim Pharmaceuticals, Inc.
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877
Telephone: (203) 798-5495

July 24, 1990

J. D. Kinneman, Chief
Nuclear Materials Safety Section A
Division of Radiation Safety and Safeguards
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

Re: Amendment of Materials License #06-19183-01

Dear Mr. Kinneman:

Enclosed are documents certifying to financial assurance for decommissioning in the amount of $750,000, as required by 10 CFR 30.35. We understand that this certification will become part of our materials license by amendment.

Enclosed is our check for $180 to cover the license amendment fee (category 3A).

Yours truly,

Clark W. Perry, Ph.D.
Radiation Safety Officer

and

James J. Keirns, Ph.D.
Chairman, Radiation Safety Committee

RECEIVED
'90 JUL 30 P2:42

'90 JUL 25 P1:39

Log Jul 27 - I
Remitter
Check No. 265798
Amount $180
Fee Category 3A
Type of Fee amd
Date Check Rec'd. 7/30/90
Date Completed 8/3/90
By: Reg

Refunded $180 per IN 90-38. 12/6/90 bk

112947
JUL 25 1990

NRCAMND6.LTR

OFFICIAL RECORD COPY MAL 10

Boehringer Ingelheim

DIGBY W. BARRIOS
President
Chief Executive Officer

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

United States Nuclear Regulatory Commission
Washington, DC 20555

I am the chief executive officer of Boehringer Ingelheim Corporation, 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877, a corporation. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part 30.

I hereby certify that Boehringer Ingelheim Corporation is currently a going concern, and that it possesses positive tangible net worth in the amount of $286,435,000.

This firm is not required to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year. This fiscal year of this firm ends on December 31.

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

Digby Barrios
President and Chief Executive Officer

June 19, 1990

Telephone: (203) 431-5849
798-4060
Telex: 179153 Answer back: BIC UT
Telefax: (203) 431-6556

Boehringer Ingelheim

Werner Gerstenberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

United States Nuclear Regulatory Commission
Washington, DC 20555

I am the chief financial officer of Boehringer Ingelheim Corporation, 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877, a corporation. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in 10 CFR Part 30.

This firm guarantees, through the parent company guarantee submitted to demonstrate compliance under 10 CFR Part 30, the decommissioning of the following facility owned or operated by a subsidiary of this firm. The current cost estimates or certified amounts for decommissioning, so guaranteed, are shown for each facility:

Name of Facility	Location of Facility	Current Cost Estimates
Boehringer Ingelheim Pharmaceuticals, Inc. Research & Development Facility	Ridgefield, CT	$750,000

This firm is not required to file a Form 10K with the U.S. Securities and Exchange Commission for the latest fiscal year.

This fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended December 31, 1989.

Telephone: (203) 431-5830
Telex: 179153 Answer back: BIC UT
Telefax: (203) 431-6556

		Thousands of Dollars
1.	Decommissioning cost estimates for facility	$ 750
*2.	Total liabilities	130,057
*3.	Tangible net worth	286,435
*4.	Net worth	290,760
*5.	Current assets	212,023
*6.	Current liabilities	101,350
*7.	Net working capital (line 5 minus line 6)	110,673
*8.	The sum of net income plus depreciation, depletion, and amortization	12,232
*9.	Total assets in United States	420,817

		Yes	No
10.	Is line 3 at least $10 million?	X	
11.	Is line 3 at least 6 times line 1?	X	
12.	Is line 7 at least 6 times line 1?	X	
13.	Are at least 90 percent of firm's assets located in the United States?	X	
14.	Is line 9 at least 6 times line 1?	X	
15.	Is line 2 divided by line 4 less than 2.0?	X	
16.	Is line 8 divided by line 2 greater than 0.1?		X
17.	Is line 5 divided by line 6 greater than 1.5?	X	

---

* Denotes figures derived from financial statements.

I hereby certify that the content of this letter is true and correct to the best of my knowledge.

Werner Gerstenberg
Executive Vice President
and Chief Financial Officer

June 15, 1990

Boehringer Ingelheim

Werner Gerstenberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

PARENT COMPANY GUARANTEE

Guarantee made this 24th day of July 1990 by Boehringer Ingelheim Corporation, a corporation organized under the laws of the State of Nevada, herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), obligee, on behalf of our subsidiary Boehringer Ingelheim Pharmaceuticals, Inc. of 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877.

Recitals

The guarantor has full authority and capacity to enter into this guarantee under its bylaws, articles of incorporation, and the laws of the State of Nevada, its State of incorporation. Guarantor has approval from its Board of Directors to enter into this guarantee.

This guarantee is being issued to comply with regulations issued by the NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the energy Reorganization act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 30 which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part 30 provide assurance that funds will be available when needed for required decommissioning activities.

The guarantee is issued to provide financial assurance for decommissioning activities for Boehringer Ingelheim Pharmaceuticals, Inc.'s Research and Development facility as required by 10 CFR Part 30. The decommissioning costs for which are $750,000.

The guarantor meets or exceeds the following financial test criteria of:

(i) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates (or prescribed amount if certification is used); and

Telephone: (203) 431-5830
Telex: 179153 Answer back BIC UT
Telefax: (203) 431-6556

(ii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the amount of the current decommissioning cost estimates (or prescribed amount if certification is used); and

(iii) Meets two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities that is greater than 0.1; and a ratio of current assets to current liabilities that is greater than 1.5; and

(iv) Tangible net worth of at least $10 million, and

agrees to comply with all notification requirements as specified in 10 CFR Part 30.

The guarantor has majority control of the voting stock for the licensee covered by this guarantee. Boehringer Ingelheim Pharmaceuticals, Inc., 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877. License No. 06-19183-01.

Decommissioning activities as used below refers to the activities required by 10 CFR Part 30 for decommissioning of the facility identified above.

For value received from the licensee pursuant to the authority conferred upon the guarantor by the unanimous resolution of its Board of Directors, a certified copy of which is attached, the guarantor guarantees to the "NRC" that if the licensee fails to perform the required decommissioning activities, as required by License No. 06-19183-01, the guarantor shall

(a) carry out the required activities, or

(b) set up a trust fund in favor of the above identified beneficiary in the amount of these current cost estimates for these activities.

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.

The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, it fails to meet the financial test criteria, the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to the "NRC" that the licensee intends to provide alternative financial assurance as specified in 10 CFR Part 30. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance if the licensee has not done so.

The guarantor also agrees to notify the beneficiary promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternate financial assurance acceptable to the beneficiary.

The guarantor agrees that within 30 days after it determines that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor for the facility under License No. 06-19183-01, it shall establish an alternative financial assurance as specified in 10 CFR Part 30 applicable, in the name of Boehringer Ingelheim Pharmaceuticals, Inc. unless licensee has done so.

The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or "NRC"-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part 30.

The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor.

The guarantor agrees to remain bound under this guarantee for as long as Boehringer Ingelheim Pharmaceuticals, Inc. must comply with the applicable financial assurance requirements of 10 CFR Part 30, for the previously listed facility except that the guarantor may cancel this guarantee by sending notice by certified mail to the "NRC" and to Boehringer Ingelheim Pharmaceuticals, Inc., such cancellation to become effective no earlier than 120 days after receipt of such notice by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. as evidenced by the return receipts.

The guarantor agrees that if Boehringer Ingelheim Pharmaceuticals, Inc. fails to provide alternative financial assurance as specified in 10 CFR Part 30, as applicable, and obtain written approval of such assurance from the "NRC" within 90 days after a notice of cancellation by the guarantor is received by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. from the guarantor, the guarantor shall provide such alternative financial assurance in the name of Boehringer Ingelheim Pharmaceuticals, Inc. or make full payment under the guarantee.

The guarantor expressly waives notice of acceptance of this guarantee by the "NRC" or by Boehringer Ingelheim Pharmaceuticals, Inc. The guarantor also expressly waives notice of amendments or modification of the decommissioning requirements and of amendments or modifications of the license.

If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to the "NRC" during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: July 24, 1990

Boehringer Ingelheim Corporation

Werner Gerstenberg

Executive Vice President
and Chief Financial Officer

Signature or witness of notary: Claire E Flackbart

Deloitte & Touche

1600 Summer Street
Stamford, Connecticut 06905-5121
Telephone: (203) 351-4600
Facsimile: (203) 351-4797

INDEPENDENT ACCOUNTANTS' REPORT

Board of Directors
Boehringer Ingelheim Corporation
Ridgefield, Connecticut

We have audited, in accordance with generally accepted auditing standards, the consolidated financial statements of Boehringer Ingelheim Corporation and Subsidiaries for the year ended December 31, 1989, and have issued our report thereon dated January 26, 1990.

Boehringer Ingelheim Corporation has prepared documents to demonstrate its financial responsibility under the "NRC's" financial assurance regulations, 10 CFR Part 30. This letter is furnished to assist the licensee in complying with these regulations and should not be used for other purposes.

The attached "Reconciliation of Amounts in Chief Financial Officer's Letter with Financial Statements" reconciles the specified information furnished in the chief financial officer's (CFO's) letter in response to the regulations with the Company's audited financial statements for the year ended December 31, 1989. In connection therewith, we have:

1. Confirmed that the amounts in the column "Per Financial Statements" agree with amounts contained in the Company's audited consolidated financial statements for the year ended December 31, 1989;

2. Confirmed that the amounts in the column "Per CFO's Letter" agree with the letter prepared in response to the NRC's request;

3. Confirmed that the amounts in the column "Reconciling Items" agree with analyses prepared by the Company setting forth the indicated items; and

4. Recomputed the totals and percentages in the CFO's letter.

Because the procedures in one through four above do not constitute an audit made in accordance with generally accepted auditing standards, we do not express an opinion on the manner in which the amounts were derived in the items referred to above. In connection with the procedures referred to above, no matters came to our attention that caused us to believe that the chief financial officer's letter and supporting information should be adjusted. Had we performed additional procedures or had we conducted an audit of the schedule in accordance with generally accepted auditing standards, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the Board of Directors of Boehringer Ingelheim Corporation and the NRC and should not be used for any other purpose.

Deloitte & Touche
Signature

June 11, 1990
Date

BOEHRINGER INGELHEIM CORPORATION

Reconciliation of amounts in Chief Financial Officers letter with Financial Statements

Year Ended December 31, 1989

Line Number in CFO's Letter		Per Financial Statements	Reconciling Items	Per CFO Letter
		(In Thousands of dollars)		
6	Total current liabilities	101,350		
	Long Term Debt	8,938		
	Deferred income taxes	23,769		
		130,057		
	Accrued decommissioning costs included in current liabilities		0	
2	Total liabilities (less accrued decommissioning costs)			130,057
	Net worth	290,760		
	Less patents, licenses, trademarks, goodwill & other intangible assets	4,325		
		286,435		
	Accrued decommissioning costs included in current liabilities		0	
3	Tangible net worth (plus decommissioning costs)			286,435
	Net income (loss)	(5,524)		
	Depreciation, depletion & amortization	17,756		
8	Total	12,232	0	12,232
5	Current Assets	212,023	0	212,023
6	Current Liabilities	101,350	0	101,350
7	Net Working Capital	110,673	0	110,673

BIC065X

CERTIFICATION BY SECRETARY

OF

BOEHRINGER INGELHEIM CORPORATION

I hereby certify that the following is a full, true and correct copy of certain resolutions duly and regularly adopted by the Executive Committee of the Board of Directors of BOEHRINGER INGELHEIM CORPORATION as of the 20th day of July, 1990:

WHEREAS, Boehringer Ingelheim Pharmaceuticals, Inc., a wholly-owned subsidiary of this Corporation, uses radioactive material at its research and development facilities for which a license, from the Nuclear Regulatory Commission ("NRC"), is required, and

WHEREAS, each NRC licensee is required to submit to the NRC a decommissioning funding plan, and,

WHEREAS, decommissioning requires the licensee "... to remove...safely from service and residual radioactivity to a level that permits release of the property for unrestricted use and termination of [the] license." 10 CFR 30.4, and

WHEREAS, the financial assurance may be provided by the licensee's parent company through a Parent Company Guarantee, and

WHEREAS, the Parent Company Guarantee is a "net worth" test which permits Boehringer Ingelheim Pharmaceuticals, Inc. to use the financial condition of Boehringer Ingelheim Corporation to meet the financial test criteria of the NRC regulations, and

WHEREAS, the cost of decommissioning is estimated, based on the NRC guidelines, to be $750,000 and the required financial assurance must be six times such estimated cost, or $4,500,000.

NOW, THEREFORE, IT IS

RESOLVED that, the appropriate officers of this corporation be, and they hereby are, authorized to guarantee financial assurance for decommissioning activities, for Boehringer Ingelheim Pharmaceuticals, Inc.'s research and development facility, required by the Nuclear Regulatory Commission, and

RESOLVED that, in accomplishing the aforesaid resolution the appropriate officers of this Corporation be, and they hereby are, authorized to execute a Parent Company Guarantee substantially in the form attached hereto and made a part hereof and to perform such other acts or things as are necessary or appropriate to accomplish the intent hereof.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed the seal of the said Corporation this 24th day of July, 1990.

Philip J. Franks
Secretary

(SEAL)

Boehringer Ingelheim

Werner Gerstensberg
Executive Vice President

Boehringer Ingelheim Corporation
90 East Ridge
P.O. Box 368
Ridgefield, Connecticut 06877

PARENT COMPANY GUARANTEE

Guarantee made this 16th day of July 1990 by Boehringer Ingelheim Corporation, a corporation organized under the laws of the State of Nevada, herein referred to as "guarantor," to the U.S. Nuclear Regulatory Commission (NRC), obligee, on behalf of our subsidiary Boehringer Ingelheim Pharmaceuticals, Inc. of 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877.

Recitals

The guarantor has full authority and capacity to enter into this guarantee under its bylaws, articles of incorporation, and the laws of the State of Nevada, its State of incorporation. Guarantor has approval from its Board of Directors to enter into this guarantee.

This guarantee is being issued to comply with regulations issued by the NRC, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the energy Reorganization act of 1974. NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 30 which require that a holder of, or an applicant for, a materials license issued pursuant to 10 CFR Part 30 provide assurance that funds will be available when needed for required decommissioning activities.

The guarantee is issued to provide financial assurance for decommissioning activities for Boehringer Ingelheim Pharmaceuticals, Inc.'s Research and Development facility as required by 10 CFR Part 30. The decommissioning costs for which are $750,000.

The guarantor meets or exceeds the following financial test criteria of:

(i) Net working capital and tangible net worth each at least six times the current decommissioning cost estimates (or prescribed amount if certification is used); and

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(ii) Assets located in the United States amounting to at least 90 percent of its total assets or at least six times the amount of the current decommissioning cost estimates (or prescribed amount if certification is used); and

(iii) Meets two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities that is greater than 0.1; and a ratio of current assets to current liabilities that is greater than 1.5; and

(iv) Tangible net worth of at least $10 million, and

agrees to comply with all notification requirements as specified in 10 CFR Part 30.

The guarantor has majority control of the voting stock for the licensee covered by this guarantee. Boehringer Ingelheim Pharmaceuticals, Inc., 90 East Ridge, P.O. Box 368, Ridgefield, CT, 06877. License No. 06-19183-01.

Decommissioning activities as used below refers to the activities required by 10 CFR Part 30 for decommissioning of the facility identified above.

For value received from the licensee pursuant to the authority conferred upon the guarantor by the unanimous resolution of its Board of Directors, a certified copy of which is attached, the guarantor guarantees to the "NRC" that if the licensee fails to perform the required decommissioning activities, as required by License No. 06-19183-01, the guarantor shall

(a) carry out the required activities, or

(b) set up a trust fund in favor of the above identified beneficiary in the amount of these current cost estimates for these activities.

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule annually within 90 days of the close of the parent guarantor's fiscal year.

The guarantor agrees that if, at the end of any fiscal year before termination of this guarantee, it fails to meet the financial test criteria, the licensee shall send within 90 days of the end of the fiscal year, by certified mail, notice to the "NRC" that the licensee intends to provide alternative financial assurance as specified in 10 CFR Part 30. Within 120 days after the end of the fiscal year, the guarantor shall establish such financial assurance if the licensee has not done so.

The guarantor also agrees to notify the beneficiary promptly if the ownership of the licensee or the parent firm is transferred and to maintain this guarantee until the new parent firm or the licensee provides alternate financial assurance acceptable to the beneficiary.

The guarantor agrees that within 30 days after it determines that it no longer meets the financial test criteria or it is disallowed from continuing as a guarantor for the facility under License No. 06-19183-01, it shall establish an alternative financial assurance as specified in 10 CFR Part 30 applicable, in the name of Boehringer Ingelheim Pharmaceuticals, Inc. unless licensee has done so.

The guarantor as well as its successors and assigns agree to remain bound jointly and severally under this guarantee notwithstanding any or all of the following: amendment or modification of license or "NRC"-approved decommissioning funding plan for that facility, the extension or reduction of the time of performance of required activities, or any other modification or alteration of an obligation of the licensee pursuant to 10 CFR Part 30.

The guarantor agrees that all bound parties shall be jointly and severally liable for all litigation costs incurred by the NRC in any successful effort to enforce the agreement against the guarantor.

The guarantor agrees to remain bound under this guarantee for as long as Boehringer Ingelheim Pharmaceuticals, Inc. must comply with the applicable financial assurance requirements of 10 CFR Part 30, for the previously listed facility except that the guarantor may cancel this guarantee by sending notice by certified mail to the "NRC" and to Boehringer Ingelheim Pharmaceuticals, Inc., such cancellation to become effective no earlier than 120 days after receipt of such notice by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. as evidenced by the return receipts.

The guarantor agrees that if Boehringer Ingelheim Pharmaceuticals, Inc. fails to provide alternative financial assurance as specified in 10 CFR Part 30, as applicable, and obtain written approval of such assurance from the "NRC" within 90 days after a notice of cancellation by the guarantor is received by both the "NRC" and Boehringer Ingelheim Pharmaceuticals, Inc. from the guarantor, the guarantor shall provide such alternative financial assurance in the name of Boehringer Ingelheim Pharmaceuticals, Inc. or make full payment under the guarantee.

The guarantor expressly waives notice of acceptance of this guarantee by the "NRC" or by Boehringer Ingelheim Pharmaceuticals, Inc. The guarantor also expressly waives notice of amendments or modification of the decommissioning requirements and of amendments or modifications of the license.

If the guarantor files financial reports with the U.S. Securities and Exchange Commission, then it shall promptly submit them to the "NRC" during each year in which this guarantee is in effect.

I hereby certify that this guarantee is true and correct to the best of my knowledge.

Effective date: _____

Boehringer Ingelheim Corporation

_____
Werner Gerstenberg

Executive Vice President
and Chief Financial Officer

Signature or witness of notary: _____

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03214
STATUS CODE: 0
FEE CATEGORY: 3A 3E
EXP. DATE: 19910531
FEE COMMENTS: _____

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: BOEHRINGER INGELHEIM PHARM., INC.
RECEIVED DATE: 900725
DOCKET NO: 3017101
CONTROL NO.: 112947
LICENSE NO.: 06-19183-01
ACTION TYPE: AMENDMENT

2. FEE ATTACHED
AMOUNT: $180.00
CHECK NO.: 265198

3. COMMENTS

SIGNED R. J. Brown
DATE 11-26-90

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED /✓/)

1. FEE CATEGORY AND AMOUNT: 3A 3E

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ✓
RENEWAL _____
LICENSE _____

3. OTHER _____
_____

SIGNED _____
DATE 12/3/22